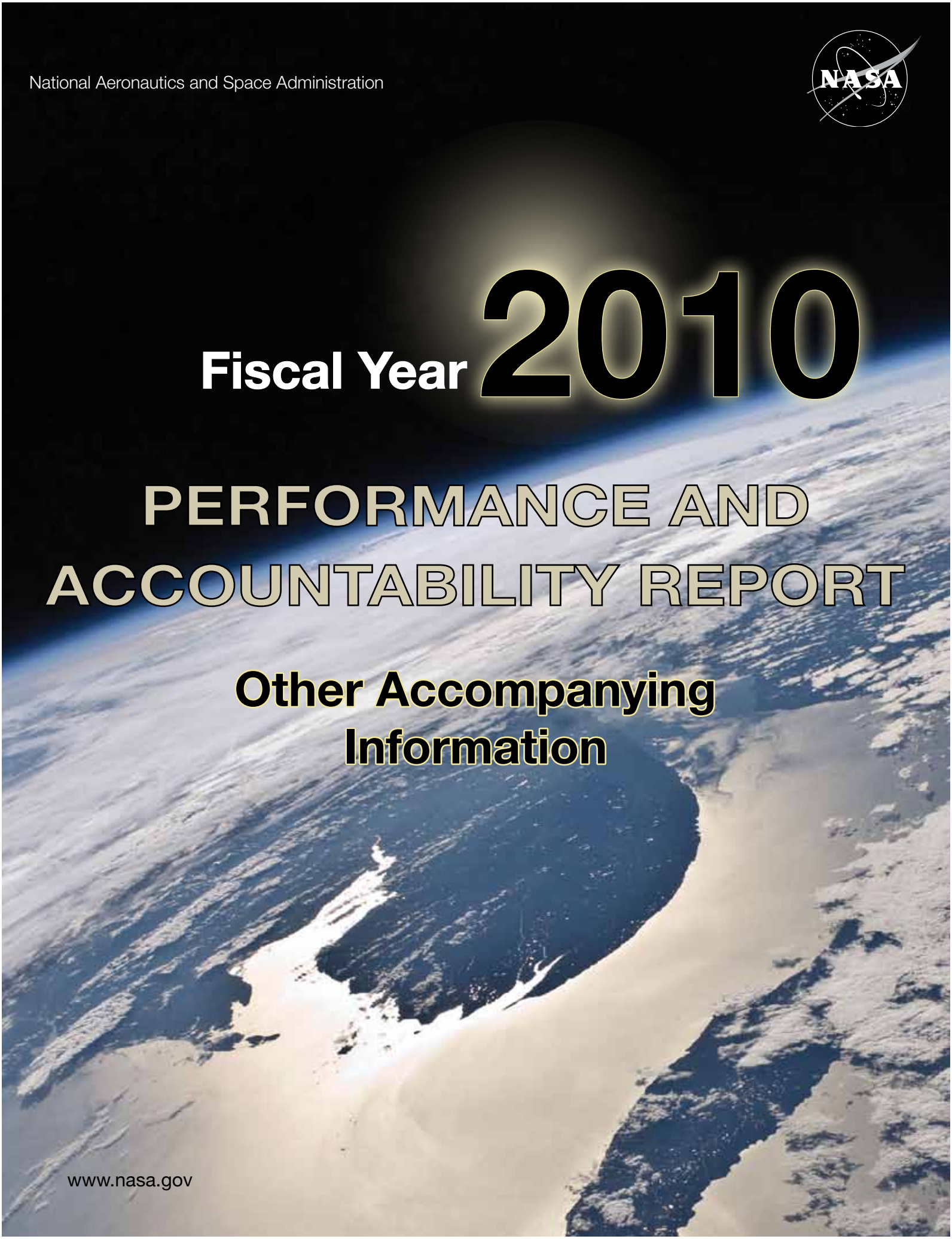
National Aeronautics and Space Administration



Fiscal Year 2010

PERFORMANCE AND ACCOUNTABILITY REPORT

Other Accompanying Information

www.nasa.gov

Message from the Administrator

November 15, 2010

I am pleased to present NASA's FY 2010 Performance and Accountability Report (PAR). This report documents NASA's progress toward achieving the challenging mission of space exploration, scientific discovery, and aeronautics research as outlined in our Strategic Plan. Further, the performance and financial information presented in this report highlights our efforts to manage taxpayer dollars responsibly, while adhering to NASA's core values of Safety, Integrity, Teamwork, and Excellence.

We are proud of all of our accomplishments this year, and specific information is highlighted and discussed in the *Detailed Performance* Section of this report. However, I would like to mention a few of our specific accomplishments. We had four successful Space Shuttle launches to the International Space Station (ISS) since last November, to complete its construction and outfit it as a scientific facility like no other. The 10th anniversary of humans aboard the station was a true milestone, and we're entering an era where it will reach its true potential as an orbiting laboratory. Likewise, we were pleased to recognize the 20th anniversary of the launching of the Hubble Space Telescope and to begin seeing new results from the instruments with which it was outfitted on last year's servicing mission. This year, we also marked the 50th anniversary of weather observations from space—a year in which our Earth-observing satellites were also helpful in assessing the status on the ground after disasters such as the Haiti earthquake and the Gulf oil spill. Most recently, a NASA team assisted the Chilean government, through the U. S. Department of State, to provide technical advice that assisted the trapped miners at the San Jose gold and copper mine.

NASA launched the following science missions: Widefield Infrared Survey Explorer (WISE); Solar Dynamics Observatory (SDO); and Geostationary Operational Environmental Satellite (GOES). WISE will scan the entire sky to uncover objects never seen before, helping to answer fundamental questions about the origins of planets, stars, and galaxies. SDO began sending back amazing images of the sun that will help us understand our neighbor and its effects on our planet and our communications systems. In September 2010, the latest Geostationary Operational Environmental Satellite, GOES-15 (also known as GOES-P), was accepted into service. It is designed to watch for storm development and weather conditions on Earth, relay communications, provide search-and-rescue support, and also provide additional capacity for our Nations' weather observing system.

Exploration Systems successfully tested the Ares 1-X for a two-minute powered flight. Results from this test will be helpful in developing the next generation of American spaceflight vehicles that could take humans beyond low-Earth orbit. Our Lunar Reconnaissance Orbiter helped us map the Moon and transform our understanding of it. Aeronautics completed the first phase of the X48-B Low Speed Flight Test Program of a Hybrid wing body aircraft, which is intended to reduce environmental impacts associated with aviation. NASA engineers and scientists tested new rocket motors, moved forward on aviation technologies to make air travel safer and cleaner, and worked with students around the country to help widen the pipeline of future leaders.

In June 2010, NASA launched its Summer of Innovation program, in support of the President's Educate to Innovate campaign for excellence in science, technology, engineering, and mathematics (STEM) education. Our first round of activities gave students in Wyoming, Idaho, Massachusetts, and New Mexico hands-on experience with space missions and science experiments. In FY 2011, we will continue to expand this important work to help develop students' interest in the core STEM disciplines. In addition, NASA awarded cooperative agreements to organizations across the United States to enhance learning through the use of NASA's Earth Science resources. The selected organizations include colleges and universities, nonprofit groups, and community college representatives.

As Administrator, one of my key responsibilities defined in the Space Act of 1958 (as amended) is to "provide for the widest practicable and appropriate dissemination of information concerning (NASA's) activities and the results thereof." As such, NASA embraces the White House's Open Government initiative calling on executive branch agencies to become more open and accountable. From making our open source software development more collaborative to creating a cloud computing platform, or making our social networks easily accessible and conducive to interaction, NASA is taking many steps to implement this openness in all of its activities. Also worthy of note is NASA's successful initiative to fund, track, and report on its accomplishment toward the goals and objectives of the American Recovery and Reinvestment Act (Recovery Act). NASA received $1,050 million of Recovery Act funding in fiscal year 2009 ($1,002 million Direct Appropriation and $48 million Reimbursable Authority), all of which has been obligated on projects to support the Nation's economic recovery and advance NASA's research mission. The Agency received an additional $4 million in Recovery Act Reimbursable Authority in FY 2010.

Although NASA was unable to achieve the Agency's Strategic Goal to retire the Space Shuttle by the end of FY 2010, the Agency plans to retire the Space Shuttle within the next year. Despite a year of transition and uncertainty, on September 29, 2010, the United States Congress voted resoundingly to endorse a clear path forward for NASA. Drawing on the ambitious plan for our Agency laid out by President Barack Obama, the Congress approved the National Aeronautics and Space Administration Authorization Act of 2010, which was signed by the President on October 11, 2010. This Act helps put the U.S. space program on a more sustainable trajectory that will lead to greater technological capabilities for our Nation, a new commercial space transportation industry, deeper international partnerships, and missions that will help inspire a new generation of Americans. With this new direction, we will also extend the life of the ISS, expand our investments in green aviation, Earth observation and education, and work to create thousands of new jobs in a vibrant, forward-looking economy.

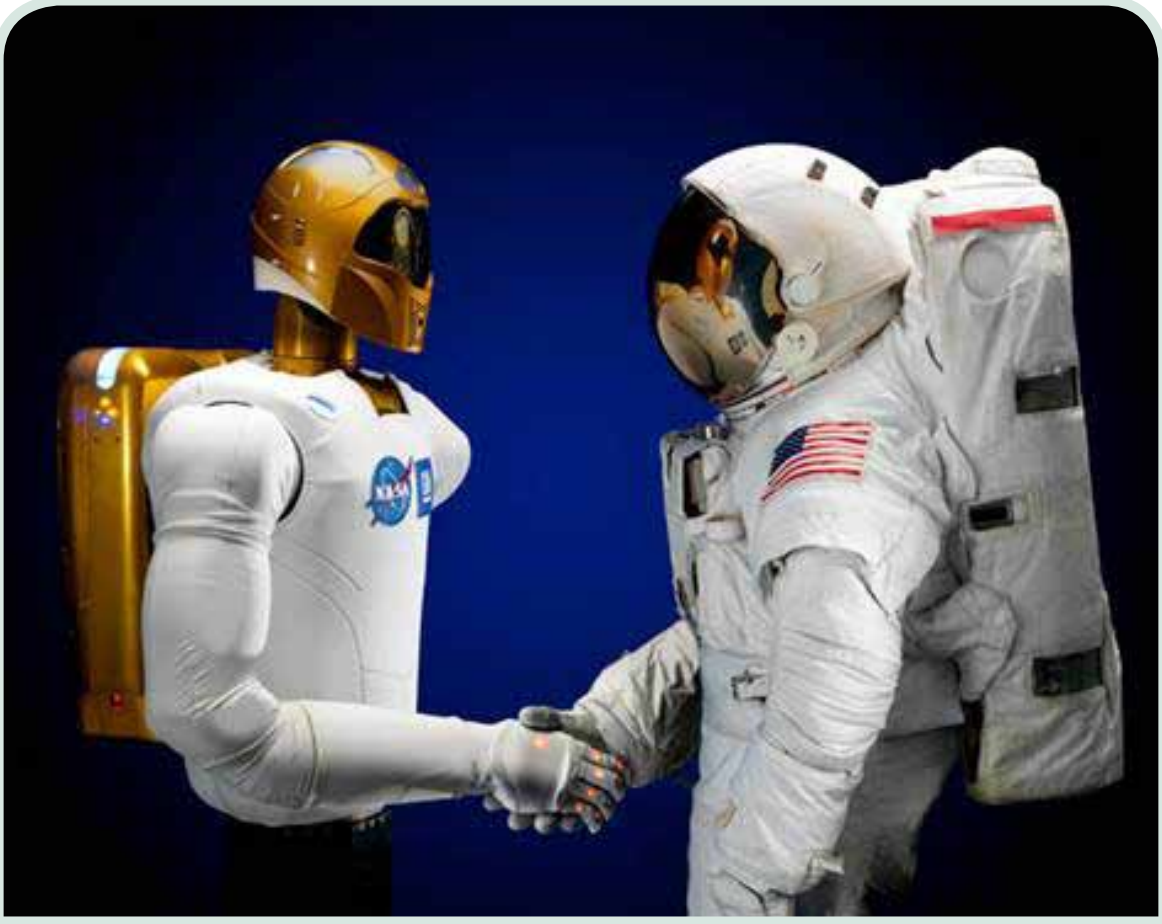
NASA makes every effort to ensure that performance data are subject to the same attention to detail as is devoted to our scientific and technical research. With this in mind, I can provide reasonable assurance that the performance data in this report are reliable and complete. Any data limitations are documented explicitly in the report.

In addition, NASA accepts the responsibility of accounting for and reporting on its financial activities. During FY 2010, NASA resolved the one remaining prior year internal control material weakness. The successful resolution of the prior year material weakness—Controls over Legacy Property, Plant, and Equipment related to valuation of legacy assets—is a result of extensive management involvement across the Agency. This achievement resulted from a sound system of financial controls and adherence to our Comprehensive Compliance Strategy and our Continuous Monitoring Program. In addition, we are now in compliance with the Federal Financial Management Improvement Act. Based on the results of this year's efforts, I am able to provide reasonable assurance that this report's financial data are reliable and complete.

My goal and focus, as NASA Administrator, is to continue to foster NASA as an exceptional resource for this Nation while keeping a sharp eye on our core values. We must always strive to find innovative ways to use NASA's missions to enhance our Nation's educational, scientific, and technological capacity.

Charles F. Bolden, Jr.
Administrator

Other Accompanying Information



Credit: NASA

Robonaut 2, a dexterous, humanoid astronaut helper, will fly to the International Space Station aboard Space Shuttle *Discovery* on the STS-133 mission. Although it will initially only participate in operational tests, upgrades could eventually allow the robot to realize its true purpose—helping spacewalking astronauts with tasks outside the Station.

Office of Inspector General Letter on NASA's Top Management and Performance Challenges

National Aeronautics and
Space Administration

Office of Inspector General
Washington, DC 20546-0001

November 12, 2010

TO: Charles F. Bolden, Jr.
Administrator

FROM: Paul K. Martin
Inspector General

SUBJECT: NASA's Top Management and Performance Challenges

As required by the Reports Consolidation Act of 2000, the enclosed report provides our views of the most serious management and performance challenges facing NASA. This document will be included in the Agency's Performance and Accountability Report for fiscal year 2010.

In determining whether to identify an issue as a top challenge, we consider the significance of the issue in relation to the Agency's mission; its susceptibility to fraud, waste, and abuse; whether the underlying matter is systemic; and the Agency's progress in addressing the challenge. To its credit, NASA has made a concerted effort over the past several years to improve its management practices and address weaknesses identified by the Agency, the Office of Inspector General (OIG), and other oversight bodies. Nevertheless, significant challenges remain across all NASA programmatic and functional areas.

We believe the following issues constitute the top management and performance challenges currently facing the Agency:

- Future of U.S. Space Flight
- Acquisition and Project Management
- Infrastructure and Facilities Management
- Human Capital
- Information Technology Security
- Financial Management

In finalizing this report, we provided a draft copy of our views to Agency officials and considered all comments received.

Finally, during the coming year the OIG will continue to conduct audits, investigations, and reviews that focus on NASA's efforts to address these and other important challenges. We hope that you find this report helpful.

Enclosure

NASA's Top Management and Performance Challenges
November 2010

Introduction

Throughout the past year, NASA has been in the midst of its most significant period of transition since the end of the Apollo era: the Space Shuttle is close to retirement after 30 years and more than 130 flights; construction of the International Space Station (ISS) is complete; and the future of the Constellation Program, the Agency's marquee human space flight program, was in doubt. Enactment of the National Aeronautics and Space Administration Authorization Act of 2010 (Authorization Act) in October clarified several important aspects of NASA's future mission, including clear direction to cancel much of the Constellation Program in favor of commercially operated crew transportation to the ISS and a detailed directive to develop a multi-purpose crew vehicle and heavy-lift launch system. However, NASA (and all other Federal Government agencies) remains in a holding pattern with respect to receiving its full fiscal year (FY) 2011 funding at least until December 2010. Until its FY 2011 appropriation is enacted, NASA is limited in the steps it can take to close out the Constellation Program and move forward on the priorities outlined in the Authorization Act. Consequently, one of the top challenges for NASA leadership is to manage the Agency's portfolio of core science, aeronautics, and human space flight and exploration missions amid this continuing lack of clarity. Moreover, when a FY 2011 budget is enacted NASA managers will need to reconcile any differences between the appropriations legislation and the Authorization Act.

To its credit, NASA has made a concerted effort over the past several years to improve its management practices and address systemic weaknesses identified by the Agency, the Office of Inspector General (OIG), and other oversight bodies. Nevertheless, significant challenges remain across all NASA programmatic and functional areas. This annual report highlights several issues we believe pose the top management and performance challenges to NASA leadership, specifically:

- Future of U.S. Space Flight
- Acquisition and Project Management
- Infrastructure and Facilities Management
- Human Capital
- Information Technology Security
- Financial Management

In deciding whether to identify an issue as a top management and performance challenge, we considered the significance of the issue in relation to the Agency's mission; its susceptibility to fraud, waste, and abuse; whether the underlying issues are systemic in nature; and the Agency's

progress in addressing the challenge. Several of these challenges, specifically acquisition and project management and infrastructure and facilities management, are long-standing concerns likely to remain top challenges for the foreseeable future. However, with focused and sustained efforts we believe that NASA leaders can make significant strides in addressing all of these challenges.

1. Future of U.S. Space Flight

Throughout NASA's history, transitioning from a legacy flight system to the next system has always presented significant challenges. The retirement of the Space Shuttle Program and transition to the next generation of space vehicles is no exception.

The Shuttle Program, originally planned for retirement at the end of FY 2010, will now continue to fly well into FY 2011. Moreover, after extensive cost and schedule overruns, concerns about adequate long-term funding, and much political debate, the Constellation Program – which was expected to produce the next generation of NASA space vehicles – has been terminated, surviving only in the form of as yet undefined crew transport and heavy-lift vehicles.

Moreover, the Agency's efforts to stimulate the emerging U.S. commercial space industry to more independently develop vehicles to transport cargo and crew represent a departure from NASA's past approach to space flight and consequently present a significant management challenge.

Transition and Retirement of the Space Shuttle Program. Foremost among NASA's Shuttle-related priorities is the need to safely complete the Program's two or three remaining flights. At the same time, transitioning from and retiring the Space Shuttle Program presents one of the top challenges facing the Agency. As the OIG noted in its March 2010 report, "Review of NASA's Progress on Retiring the Space Shuttle Program," NASA was unable to complete the remaining planned Shuttle flights by the end of FY 2010 as initially planned, and rescheduled the final flights for November 2010 and February 2011.[1] While the Authorization Act provides for an additional Shuttle mission to be flown no earlier than June 1, 2011, it remains to be seen whether NASA will obtain the funding needed to support this extra flight.

In addition to managing Shuttle funding challenges, the transition and retirement activities associated with the end of the Shuttle Program present one of the largest such efforts ever undertaken by NASA. The Shuttle Program is spread across hundreds of locations, occupies over 654 facilities, and involves more than 1.2 million line items of personal property with a total equipment acquisition value exceeding $12 billion. The challenge of dealing with all of this infrastructure and personal property has been further complicated by termination of the Constellation Program, which was slated to use much of the Shuttle Program's infrastructure, and language in the Authorization Act that directs NASA to develop a multi-purpose crew vehicle and heavy-lift launch system. The OIG is currently examining NASA's transition and retirement efforts for the Shuttle Program given the significance and magnitude of this effort.

[1] NASA's attempt to launch space shuttle Discovery in early November was thwarted by a series of technical problems. The mission was rescheduled for launch no earlier than November 30, 2010.

Finally, Agency managers continue to address the challenge of retaining the skilled workforce necessary to safely fly out the remaining Shuttle missions while simultaneously making personnel cuts necessary to retire the Program.

Commercial Launch Providers. Once the Space Shuttle has flown its last flight, NASA will need to rely on other countries for access to the ISS until either it develops its own follow-on system or a commercial vehicle is proven capable of carrying cargo and humans into space. With respect to cargo, NASA has been working to develop commercial providers for the past several years through its Commercial Orbital Transportation Services (COTS) Program. After a series of delays, the first COTS demonstration flight is scheduled for December 2010 by Space Exploration Technologies Corporation (SpaceX).

Efforts to develop commercial vehicles capable of carrying humans to the ISS and other low Earth orbit destinations present significant challenges. One issue of particular complexity is NASA's intent to "human-rate" any new flight system, whether developed commercially or by NASA. NASA only recently developed comprehensive human-rating standards for NASA-developed systems, and the certification process that will be used to human-rate commercial vehicles – several of which are already well under development – is not yet fully defined. Given the importance of this issue, the OIG is examining NASA's development of human-rating standards for commercial vehicles and will evaluate how commercial space transportation providers intend to implement NASA's safety and human-rating requirements.

Adding to this challenge is NASA's need to select an acquisition strategy for developing a commercial capability for crew transportation. Specifically, NASA must decide how it intends to partner with commercial providers in the development of new space vehicles for human space flight. In doing so, NASA must balance its role as a partner of commercial providers with its responsibility to ensure that commercially produced vehicles are safe for NASA astronauts.

NASA also faces challenges related to the U.S. market for medium-class launch vehicles suited for many NASA science missions, a market segment that has suffered from foreign competition and lack of demand by non-Government customers. While new launch vehicles in this class are currently under development as part of NASA's COTS Program, in the near-term NASA faces limited domestic availability of medium-class launch vehicles for its science missions. This situation has been exacerbated by the Department of Defense's decision to stop using the Delta II, the medium-class launch vehicle that has been NASA's launch vehicle of choice for nearly 60 percent of its science missions over the last decade.

NASA Transportation Systems. The Authorization Act represents somewhat of a compromise between those who believe NASA should continue to develop its own space transportation systems (like Constellation) and those who believe NASA should rely on commercial launch providers for access to the ISS and low Earth orbit. Specifically, the Act directs NASA to foster development of commercial cargo and crew capabilities while simultaneously developing its own launch system and crew vehicle. Addressing both of these responsibilities presents a significant management challenge for NASA leadership.

Moreover, the level of specificity contained in the Authorization Act regarding the design and development of NASA's launch system presents its own challenges. For example, the

Authorization Act directs NASA to develop a heavy-lift vehicle capable of reaching and transiting beyond low Earth orbit, carrying a new crew vehicle, and serving as a backup for supplying cargo and crew to the ISS. In addition, the Authorization Act encourages the extension of existing vehicle development contracts associated with the Constellation Program. This latter directive may limit NASA's ability to move away from the design of the Constellation launch vehicle to explore alternative architectures.

Similarly, the crew vehicle called for in the Authorization Act appears similar in design to the Constellation Program's Orion Crew Exploration Vehicle. However, the history and development challenges of Orion have been well documented by the Government Accountability Office (GAO), the NASA Advisory Council, and the Aerospace Safety Advisory Panel. For example, because of concerns about excess weight and in order to improve schedule and cost confidence, the original six-person design was modified in 2009 to a four-person configuration.

International Space Station. After years of development, construction of the ISS is complete. The Authorization Act extends the life of the ISS until at least 2020 and directs NASA to maximize its productivity and use with respect to scientific and technological research and development, advancement of space exploration, and international collaboration. The Act also instructs NASA to provide initial financial assistance to and enter into a cooperative agreement with a non-profit organization to manage the activities of the ISS national laboratory. Both of these directives present significant management challenges. As discussed above, the retirement of the Space Shuttle signals an end to the United States' ability, at least in the short term, to transport supplies and experiments to the ISS, and NASA will be dependent upon the Russians to transport astronauts to the ISS until commercial vehicles are available. In addition, NASA needs to continue to develop incentives and partnerships to encourage use of the ISS by other U.S. Government agencies, other nations, and the commercial sector.

2. Acquisition and Project Management

Effective acquisition and project management are critical to NASA's ability to achieve its overall mission, but systemic weaknesses in these areas have proven a long-standing challenge for the Agency. The OIG is focusing increased attention on these issues to help ensure that NASA is paying contractors in accordance with contract terms and is receiving what it paid for on schedule.

Cost and Schedule Estimates. NASA historically has struggled with establishing realistic cost and schedule estimates for the projects in its portfolio, with OIG and GAO reviews identifying cost growth and schedule slippage in the majority of the Agency's major projects.

Both the OIG and GAO have found that cost growth and schedule slippage in NASA programs is often due to the Agency's failure to address systemic acquisition management weaknesses related to requirements growth, cost estimating, technology development, design stability, funding, and system integration. For example, in February 2010 GAO conducted an assessment of NASA's 19 most costly projects (combined life-cycle cost of $66 billion) and found that within the last 3 years, 10 of the 19 projects experienced cost growth averaging $121.1 million or

18.7 percent, while the average schedule delay was 15 months.[2] GAO found that the cost growth and schedule slippage resulted, in part, from failing to adequately identify requirements and underestimating complexity and technology maturity.

One program in particular, the James Webb Space Telescope, is emblematic of the problems NASA has faced in developing realistic cost and schedule estimates. In July 2003, NASA scheduled the Webb Telescope for launch in August 2011 at an estimated cost of $1.6 billion. In succeeding years, the planned launch date slipped to June 2014 and the estimated total life-cycle cost increased to $5.09 billion. Concern over growing cost and schedule delays with Webb prompted a June 2010 congressional request for an independent review of the program. This assessment, released publicly on November 10, cited problems with budgeting and program management rather than technical performance as the reasons for the delays and increases in costs for NASA's flagship science project. The report concluded that Webb's earliest possible launch date of September 2015 was dependent on the project making a series of critical management changes coupled with an infusion of an additional $500 million over and above the funds already identified for the project in the President's FY 2011 and FY 2012 budget profile.

Project Management. To execute projects within established cost and schedule estimates, NASA needs to maximize the use of a wide range of project management tools including earned value and risk management. While effective project management historically has been a major challenge, NASA has shown that it can use these project management tools to produce positive results. For example, during the past year we found that managers for the Tracking and Data Relay Satellite (TDRS) K and L Project implemented a robust risk management process and made informed decisions based on earned value management data. As a result, development of two replacement satellites was within budget and on schedule. Conversely, NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) Program lacked an effective cost control process and experienced such significant cost growth early in development that the project was nearly canceled. Even though TDRS K and L are the 11th and 12th satellites built for the program while many other NASA projects are unique instruments, the challenge for NASA is to use sound management tools to identify and mitigate programmatic risks in all of its projects.

Contract Management. NASA spends approximately 85 percent of its $18 billion budget on contracts and awards. Given the significant amounts of taxpayer funds at risk, continued findings by the OIG and GAO identifying systemic weaknesses in NASA's contract management practices illustrate that this issue remains a top Agency challenge. For example, the OIG has identified instances of fraud, waste, and abuse by program participants that bring into question the effectiveness of the internal controls in NASA's Small Business Innovation Research (SBIR) Program. OIG investigations have found that some award recipients received multiple SBIR contracts for essentially the same research and provided duplicate deliverables or questionable research products. An ongoing OIG audit of NASA's SBIR Program is examining whether Program management has implemented adequate internal controls to ensure the contract funds are appropriately spent. In addition, the audit is reviewing whether SBIR contracts contain unallowable and unsupported costs.

[2] GAO: "NASA: Assessments of Selected Large-Scale Projects" (GAO-10-227SP, February 1, 2010).

In another area of contract management, we found that NASA could improve its award fee structure in some contracts to motivate higher performance. For example, NASA's contract with the Zero Gravity Corporation (Zero G) to provide microgravity flight services permits the company to earn 100 percent of the available award fee if Zero G flies only 60 percent successful parabolas. We recommended that NASA revise the contract's performance-based payment structure so that payments more accurately reflect the contractor's performance.

GAO has also reported that NASA's award-fee payments to contractors did not always translate into desired program outcomes. For example, NASA paid the contractor for the Earth Observing System Data and Information System 97 percent of the available award fee despite a delay in completion of the contract of over 2 years and an increase in cost of more than 50 percent.[3] The GAO also found that NASA had not evaluated the overall effectiveness of award fees and did not have metrics in place for conducting such evaluations. The report made a series of recommendations, which NASA has since implemented, aimed at tying award-fee payments to desired outcomes. Because cost-plus-award-fee contracts account for almost half of NASA's obligated contract dollars, NASA will continue to face challenges in this area.

3. Infrastructure and Facilities Management

NASA is the ninth largest Federal Government property holder, controlling a network of approximately 5,400 buildings and structures that support Agency research, development, and flight activities. NASA's ability to effectively manage the necessary maintenance and renovation of this large and aging portfolio of facilities is a critical challenge facing the Agency.

Maintenance, Repair, and Use of Aging Facilities. For years, NASA has struggled with its aging and underutilized infrastructure and the related issue of managing its backlog of deferred maintenance projects. According to NASA's 2008 Real Property Asset Management Plan, approximately 10 to 50 percent of NASA's warehouses and 30 to 60 percent of its laboratories are underutilized. NASA officials also report that more than 80 percent of the Agency's facilities are 40 or more years old and beyond their design life. Under its current policy, NASA is required to maintain these facilities to keep them operational or, if they are not being used, to ensure they do not pose a safety hazard. In FY 2009, NASA reported spending approximately $283 million to repair and maintain its facilities, while Agency-wide deferred maintenance costs that year were estimated at $2.55 billion.[4]

The Aerospace Safety Advisory Panel cited NASA's aging facilities as an area of concern in its most recent annual report, and NASA's backlog of maintenance and repair projects has been cited by Congress for several years. Moreover, a 2010 report from the National Research Council cited a "steady and significant decrease in NASA's laboratory capabilities, including equipment, maintenance, and facility upgrades" that require more maintenance than funding permits.

[3] GAO: "NASA Procurement: Use of Award Fees for Achieving Program Outcomes Should Be Improved" (GAO-07-58, January 17, 2007).

[4] NASA Annual Performance Metrics Report.

NASA's 2008 Authorization Act directed the Administrator to "determine and prioritize the maintenance and upgrade backlog at each of NASA's Centers and associated facilities, and . . . develop a strategy and budget plan to reduce that maintenance and upgrade backlog by 50 percent over the next five years." However, according to Agency officials funding constraints over the years have resulted in little reduction in NASA's backlog of deferred maintenance projects. Similarly, the recently enacted 2010 Authorization Act requires NASA to examine its structure, organization, and institutional assets and develop a strategy for the most efficient retention, sizing, and distribution of facilities and other infrastructure consistent with NASA's mission. Compiling such a report is difficult enough, but even more daunting is obtaining the funds necessary to repair and maintain NASA's key aging facilities or building a consensus on which facilities and infrastructure the Agency can no longer afford to support.

The OIG is currently evaluating NASA's efforts to effectively select and fund maintenance projects to reduce its deferred maintenance backlog. Specifically, we are examining whether NASA Centers appropriately communicated funding priorities and needs in the budget process and accurately captured costs associated with maintenance and repair activities in a consistent manner. In addition, the OIG recently initiated a second facilities-related audit evaluating NASA's response to requirements in the 2010 Authorization Act to re-scope and, as appropriate, downsize NASA's facilities footprint.

The ongoing challenge for NASA leadership in this area is to reduce the backlog of essential maintenance projects. Failure to do so will further increase the risk that Agency facilities will not be available for future use or will pose additional risks to the safety of personnel and equipment and the accomplishment of NASA's missions. Moreover, continuing to "kick the can down the road" by failing to take action to renovate essential facilities will result in higher costs to repair these facilities in the future.

Enhanced Use Leasing. As discussed previously, NASA has an excess of real property and faces considerable challenges addressing the maintenance needs of its aging facilities. Enhanced Use Leasing (EUL) offers the Agency one tool to help address this challenge. EUL authority allows agencies to retain proceeds from leasing out underutilized real property to private sector and other non-Federal governmental entities and to accept in-kind consideration in lieu of cash for rent.

Congress granted NASA limited EUL authority in FY 2003 and at that time NASA began demonstration programs at Ames Research Center and Kennedy Space Center. The GAO reviewed NASA's use of EULs in 2007 and found the Agency was using EUL authority to develop underutilized office space, unique research and development facilities, and land.[5] As reported for FY 2009, NASA had realized about $3.4 million in net revenue and over $530,000 of in-kind consideration, most of which would not have been realized without EUL authority.

A leasing study prepared by NASA in 2009 in response to a congressional directive highlighted several challenges the Agency faces in expanding its use of EUL authority. For example, NASA must ensure that the methodology it uses for determining leasing costs are consistent with normal real estate practices and that lease rates are fair and reasonable. The study also noted that the

[5] GAO: "NASA: Enhanced Use Leasing Program Needs Additional Controls" (GAO-07-306R, March 1, 2007).

costs of NASA's unique facilities and capabilities are embedded in NASA's overall real property costs and therefore the cost of leasing a NASA site is generally more expensive than the cost of private sector facilities. In addition, the costs associated with repairing NASA's aging facilities may be an obstacle to attracting potential tenants.

NASA will need to address these and other challenges in order to use its EUL authority to its full potential. EULs offer NASA the incentive to more fully utilize its facilities, which could help reduce the overhead costs associated with operating NASA Centers. Revenue from EULs also could be used by NASA to reduce the costs of maintaining its aging infrastructure.

4. Human Capital

The impending retirement of the Space Shuttle and NASA's redirection from the Constellation Program to support for development of commercial space flight capabilities present the Agency with the significant challenge of balancing its workforce structure with the needs of its shifting missions. As NASA reassesses its acquisition and workforce transition plan, the OIG will continue to monitor the Agency's progress in addressing these changing human capital challenges.

Attracting and Retaining a Highly Skilled Workforce. Maintaining a highly skilled, diverse, results-oriented civilian and contractor workforce is vital to successfully accomplishing NASA's mission. As the Agency's mission changes, NASA faces increasing competition from the private sector for the best scientific and engineering talent. Moreover, as its workforce ages NASA will face particular challenges in attracting and retaining highly specialized skill sets to sustain key Agency capabilities.

With regard to its future workforce, NASA plays a leading role in the Federal Government's efforts to inspire interest in science, technology, engineering, and mathematics (STEM). Through its Summer of Innovation Program, NASA seeks to engage students in NASA's mission and strengthen the Nation's future workforce through intensive summer teaching and learning experiences. NASA also sponsors competitions like the "Environmentally Responsible (Green) Aviation High School Student Challenge," which invites students to propose ideas and designs for future aircraft that use less fuel, produce less harmful emissions, and make less noise, and offers internships and fellowships in a wide variety of disciplines for both high school and college students. NASA will need to continue to use these and other innovative means to help meet its future workforce needs.

Future of the Astronaut Corps. Identifying the proper role and size of NASA's Astronaut Corps in a post-Space Shuttle environment presents special challenges to Agency leaders. Since its inception in 1959, the Astronaut Corps has been an integral part of the NASA mission and over the years the Agency's astronauts have adapted to a variety of new roles and missions. The cancellation of the Constellation Program and the increased reliance on the private sector to provide transportation to and from space raises new questions for the future of NASA's Astronaut Corps. NASA has taken an important step to address this management challenge by enlisting the National Research Council to conduct an independent study examining the role and size of the Astronaut Corps following the Shuttle's retirement.

In addition to recent changes in NASA's mission and direction, a series of long-standing challenges remain in this area. For example, NASA must ensure that astronauts maintain medical eligibility for missions as they age and increase their accumulated radiation exposure. Further, NASA has not fully identified how the Astronaut Corps in a post-Space Shuttle world will retain the skills necessary to perform the ISS mission with limited flight opportunities following the Shuttle's retirement in 2011.

Ensuring that Agency Employees Comply with Ethical Responsibilities. NASA employees routinely work side-by-side with contractors, international partners, and researchers from academia. Many NASA employees also seek opportunities in the private sector following their Government employment and others move between jobs in the private sector and NASA. These conditions pose particular challenges to NASA leadership to ensure that employees abide by ethics laws and regulations. Moreover, as NASA moves more deeply toward privatization of space exploration, this challenge may increase in both scope and complexity.

Ethics issues continue to account for a significant portion of the OIG's investigative caseload. For example, in a recent case a senior NASA manager was convicted of a conflict of interest charge in connection with his participation in NASA contracts given to a company owned by his wife. Another senior NASA manager used a majority of the $1.5 million discretionary fund he controlled to initiate several studies that financially benefited him and others. Further, a high-ranking NASA official was convicted of steering a $10 million contract to a consulting client and later entered a guilty plea to conspiracy charges in connection with actions he took to obtain and receive funds from a sole-source contract.

It is imperative that NASA employees, as stewards of the Agency's budget, remain aware of and comply with appropriate ethics laws and regulations. The OIG will continue to work with Agency officials to address potential ethics issues through a combination of training and enforcement.

5. Information Technology Security

NASA information technology (IT) systems and networks control spacecraft, collect and process scientific data, and enable NASA personnel to collaborate with their colleagues around the world. Users of these systems number in the hundreds of thousands and include NASA personnel, contractors, academia, and the public. As computer technology has advanced, NASA has become dependent on computerized information systems to carry out daily operations and to process, maintain, and report essential information. Although most NASA IT systems contain data that may be widely shared, others house sensitive information which, if released or stolen, could result in significant financial loss or adversely affect national security. Accordingly, it is imperative that NASA properly protect its IT systems and networks.

Role of the Chief Information Officer. Achieving the Agency's IT security goals will require sustained improvements in NASA's overarching IT management practices. Federal law and NASA policy designate the Headquarters-based Chief Information Officer (CIO) as the NASA official responsible for developing IT security policies and procedures and implementing an Agency-wide IT security program. However, we have found that the CIO has limited ability to

direct NASA's Mission Directorates to fully implement IT security programs, and consequently key Agency computer networks and systems operated by the Mission Directorates do not consistently comply with Agency-wide IT policy. Until the Mission Directorates fully implement NASA's IT security programs, the Agency will continue to be at risk for security incidents that can have a severe adverse effect on Agency operations, assets, or individuals.

IT Security Weaknesses. While the Agency reduced the severity of IT security from a material weakness to a significant deficiency in 2008 for purposes of the Administrator's Annual Statement of Assurance, recent audit work by the OIG found that significant obstacles remain in NASA's effort to develop a highly effective IT security program.

As part of our FY 2009 and FY 2010 Federal Information Security Management Act (FISMA) audits, we found that NASA's IT security program had not fully implemented key requirements needed to adequately secure Agency information systems and data. For example, NASA did not meet FISMA requirements for annual security controls testing and contingency plan testing. In our judgment, these deficiencies occurred because NASA did not have an independent verification and validation function for its IT security program.

We also found that the Office of the Chief Information Officer (OCIO) had not effectively managed corrective action plans used to prioritize mitigation of IT security weaknesses. This occurred because the OCIO did not have a formal policy for managing the plans and did not follow recognized best practices when it purchased an information system intended to facilitate Agency-wide management of IT corrective action plans. We found that the information system was significantly underutilized and therefore was not an effective tool for managing corrective action plans.

Through our audits and assessments during the past year, the OIG has found significant and recurring internal control weaknesses in NASA's IT security control monitoring and cyber-security oversight. For example, we found that the Agency did not ensure that its computer servers remained securely configured over time. We also found that the Agency's vulnerability and patch management practices could be improved by adding a control to verify that 100 percent of the devices connected to NASA's networks undergo vulnerability and patch monitoring. We found control weaknesses related to user account management, the installation of unauthorized software, and inaccuracies with hardware and software inventories for a key NASA system. Finally, we found that the Agency's transition from Internet Protocol Version 4 (IPv4) to IPv6 needed substantial improvement.

Attacks on IT Infrastructure. The significance of NASA's IT security weaknesses is highlighted by the increasing number of cybersecurity threats facing the Agency. These threats are evolving, both in scope and sophistication, and present an ongoing challenge to NASA managers. For example, in May 2009 NASA notified the OIG of a suspicious computer connection from a system that supports NASA missions. The subsequent OIG investigation confirmed that cybercriminals had infected a computer system that supports one of NASA's mission networks. Due to the inadequate security configurations on the system, the infection caused the computer system to make over 3,000 unauthorized connections to domestic and international IP addresses including, but not limited to, addresses in China, the Netherlands,

Saudi Arabia, and Estonia. The sophistication of the attack confirms that this event was a focused and sustained effort to target NASA's data.

The OIG also alerted NASA to systemic IT deficiencies discovered during the course of an investigation into unlawful computer intrusions at the Jet Propulsion Laboratory (JPL). The OIG determined that the intrusions resulted in the theft of approximately 22 gigabytes of program data illegally transferred to an IP address in China. The stolen data included information protected under International Traffic in Arms Regulations and Export Administration Regulations. The OIG investigation found that a significant contributing factor to the theft was inadequate security settings at JPL, which allowed the intruder access to a wide range of sensitive data. NASA's challenge is to redouble its efforts to improve IT security to decrease the likelihood of similar incidents in the future even as the threat expands and the sophistication of the cyber attacks increases.

6. Financial Management

After receiving disclaimers of opinion on its financial statements during the previous 7 years, this year NASA was able to develop sufficient financial evidence and documentation to allow auditors to issue a qualified opinion on the Agency's FY 2010 financial statements. The qualification was related to the valuation of property, plant, and equipment (PP&E) and materials in prior years and its possible effects on the current year statements of net cost and changes in net position. Over the past several years, NASA financial managers – working with the OIG and the independent accounting firm – have continued to make steady progress resolving previously identified weaknesses and their efforts resulted in the auditors' qualified opinion. While the ultimate goal for the Agency is an unqualified opinion, the FY 2010 results are a significant accomplishment and position NASA well for the future.

During FY 2010, NASA continued to develop policies, procedures, and controls to address its internal control deficiencies. For example, NASA revised its policy and procedures for quantifying its environmental cleanup costs associated with decommissioning PP&E. Nevertheless, challenges remain. Specifically, NASA management and Ernst & Young LLP continue to identify deficiencies in the Agency's system of internal control surrounding contractor-held legacy PP&E. As shown in the following table, this deficiency was reported as a material weakness for several years.

Internal Control Deficiencies						
Fiscal Year		2010	2009	2008	2007	2006
Audit Opinion		Qualified	Disclaimer	Disclaimer	Disclaimer	Disclaimer
Internal Control Deficiencies	Property, Plant, and Equipment	significant deficiency	material weakness	material weakness	material weakness	material weakness
	Financial Statement Preparation Process and Oversight	—	—	material weakness	material weakness	material weakness
	Environmental Liability Estimation*	significant deficiency	significant deficiency	—	—	—
	Federal Financial Management Improvement Act*	—	significant deficiency	—	—	—
* The deficiency was included in the Financial Statement Preparation Process and Oversight weakness for FYs 2006–2008.						

Property, Plant, and Equipment. NASA has struggled with asserting to the completeness and valuation of its legacy assets, the largest of which is the ISS. However, in October 2009 the Federal Accounting Standards Advisory Board issued an accounting standard clarifying that reasonable estimates of historical cost may be used to value general PP&E.[6] Consequently, NASA's challenge was to use this standard to value its legacy assets to resolve one of the key obstacles to obtaining an opinion in FY 2010.

In implementing this new standard, NASA considered using different sources to estimate historical capitalized amounts, such as appraisals and budget estimates, as alternatives to its historical approach of using contractor cost reports and capitalized amounts recorded in its Contractor-Held Asset Tracking System (CHATS).[7] For the ISS, NASA determined that the CHATS figures provided the more precise estimate and therefore it would continue to use these figures to estimate the historical cost of the ISS.

However, while conducting routine analysis, NASA discovered an unexpected $1.1 billion adjustment by a contractor in CHATS for materials that are considered depreciable property for the ISS. Upon further investigation, NASA determined that approximately $470 million of this adjustment was the result of the contractor failing to report an increase when the underlying transaction occurred and that the remainder was a "double count" having previously been reported by the contractor. NASA appropriately never recorded this double count. Nevertheless, this discovery calls into question the rigor and effectiveness of the controls surrounding contractor reporting in CHATS and indicates that NASA needs to further develop its controls in this area.

[6] Statement of Federal Financial Accounting Standard (SFFAS) No. 35, *Estimating the Historical Cost of General Property, Plant, and Equipment* (*Amending Statements of Federal Financial Accounting Standards* 6 and 23).

[7] CHATS is a Web-based application that contractors use to report to NASA summarized values of Government-owned materials and property in its possession.

Going forward, NASA needs to focus on fully implementing its PP&E capitalization policy and procedures for assets procured on or after October 1, 2007. For example, during FY 2010 testing the auditors identified two instances where completed and fully acquired assets were also recorded in the work-in-process account. As a result, the auditors could not conclude that NASA's controls in this area were operating effectively and had to expand their testing.

In addition to valuing legacy assets, NASA also must account for materials related to those assets, most of which are contractor-held. In light of the Space Shuttle's scheduled retirement, NASA considered whether any of the materials included in its reported balances were excess or obsolete to NASA. NASA determined that its current method for accounting for these materials did not reflect NASA's research and development mission and that a large majority of these materials would have no value by the end of the current fiscal year due to the Shuttle's retirement. Therefore, NASA adopted a change in accounting principle that permitted the removal of the entire $2.7 billion materials asset line item from its balance sheet.

Prior to FY 2010, NASA did not capitalize property reported in year-end CHATS or other annual contractor reports because it had not analyzed the data prior to November 15 of each year. Instead, NASA recorded an accrual to estimate the value of contractor-held property as of September 30. As part of the preparation of the FY 2010 financial statements, NASA performed its analysis prior to November 15 for the first time and this analysis resulted in the Agency recording a $661 million adjustment to contractor-held property. The size of the adjustment calls into question the sufficiency and basis of the methodology used to calculate these estimates.

Due to the volatility of NASA's property balances and the risk of recording estimates for property, accounting for PP&E remains a significant management challenge. Ongoing efforts by NASA management to develop a robust and rigorous review process that both validates and challenges the adequacy of estimation techniques and the sufficiency of supporting documentation are important in preparing for future audits of these estimates. The volatility and risk associated with these balances are expected to decline as legacy contracts conclude.

Improper Payments Information Act (IPIA) Assessment

Improper Payment Compliance

NASA is dedicated to reducing fraud, waste, and abuse by adequately reviewing and reporting programs susceptible to improper payments in accordance with the Office of Management and Budget (OMB) Circular A-123, Management's Responsibility for Internal Control, Appendix C, Requirements for Effective Measurement and Remediation of Improper Payments. To improve the integrity of the Federal government's payments and the efficiency of its programs and activities, Congress enacted the Improper Payments Information Act (IPIA) of 2002 (Public Law No. 107-300). The IPIA contains requirements in the areas of improper payment identification and reporting. It requires agency heads to annually review all programs and activities, identify those that may be susceptible to significant improper payments, estimate annual improper payments in susceptible programs and activities, and report the results of their improper payment activities.

In August 2006, OMB issued Appendix C of OMB Circular A-123. Appendix C supersedes OMB's previous promulgations on improper payments and requires all Executive branch agencies to:

- Review all of its programs and activities to identify those susceptible to significant improper payments. OMB defines significant improper payments as those in any particular program or activity that exceed both 2.5 percent of program payments and $10 million annually;
- Obtain a statistically valid estimate of the annual amount of improper payments in programs and activities;
- Develop corrective action plans and reduction targets for programs and activities found to have significant improper payments; and
- Include an estimate of the annual amount of improper payments in programs and activities, along with the progress in reducing them, in the PAR.

The term "payment "is defined by the Office of Management and Budget (OMB) Circular A-123 Appendix C guidance as any payment, including commitments for future payments, such as loan guarantee that is derived from Federal funds or other Federal sources; ultimately reimbursed from Federal funds or resources; or made by a Federal agency, a Federal contractor, a governmental or other organization administering a Federal program or activity.

Additionally, NASA took into consideration the increased emphasis on reducing improper payments as outlined in Executive Order (EO) 13520 Reducing Improper Payments and Eliminating Waste in Federal Programs issued by President Barack Obama on November 23, 2009. EO 13520 intensifies efforts to eliminate payment error, waste, fraud and abuse in major programs administered by the Federal government, requires increased focus on identifying and eliminating the highest number of improper payments and assigns accountability, and encourages partnership and collaboration among Federal, state and local governments. The EO adopts a comprehensive set of policies, including transparency and public scrutiny of significant payment errors. Also, on July 22, 2010, the President signed into law the Improper Payments Elimination and Recovery Act of 2010 (IPERA), which mandates the recoupment of improper and erroneous payment dollars by recovery audits targeting all types of programs and activities including grants. IPERA urges departments and agencies to use all available tools and technologies to address improper payments and intensifies the reporting requirements on the results and methods used.

Throughout the past four years, NASA has diligently met IPIA program compliance by launching OMB-compliant risk assessments, updating NASA payment process documentation, selecting OMB-compliant statistical samples for testing, drafting comprehensive test procedures, reporting results in the annual PAR and documenting the IPIA review process and results in comprehensive work papers.

During FY 2010, NASA continued its efforts to improve the integrity of its payments and the efficiency of its programs by updating the annual risk assessment. The updated risk assessment identified 33 programs in scope and covered $18.4 billion in FY 2009 disbursements. Once the programs were evaluated, NASA identified the following five programs as susceptible to improper payments:

- **Constellation Systems**
- **Cosmic Origins**
- **Earth Science Research**
- **Earth Systematic Missions**
- **Space Communications**

Total payments related to these programs amounted to approximately $3,631,633,701 in FY 2009. During FY 2010, with the assistance of contractor support, NASA performed an improper payment review of each of these programs in accordance with OMB Circular A-123, Appendix C and identified an estimated total of approximately $7,698,973 in improper payments. This annual estimate was based on NASA's FY 2009 payment transaction data (October 1, 2008 through September 30, 2009). Although the testing performed determined that the programs did not have significant improper payments, as defined by OMB A-123, Appendix C, NASA will continue to monitor payments and take appropriate corrective action for any such improper payments.

Improper Payments Information Act Reporting Details

To conduct the FY 2010 IPIA assessment, NASA adhered to the established improper payment methodology, considered lessons learned from past IPIA assessments, and the NASA Risk Assessment methodology. In order to satisfy the IPIA requirements the following tasks and activities were executed:

- **Updated the FY 2009 risk assessment;**
- **Selected a statically valid sample of payments;**
- **Conducted a test of all transactions selected in the sample and extrapolated the results to make a valid estimate; and**
- **Reported on the details of testing and findings (if any) of the program**

In the following section we summarize the details of the FY 2010 IPIA program.

I. Risk Assessment

NASA's risk assessment methodology was developed using criteria established for determining levels of risk and evaluating all major programs against these criteria. Risk factors included conditions related to financial processing and internal controls, internal and external monitoring and assessments, human capital risk, programmatic risk, and the nature of programs and payments.

In FY 2010, NASA performed a comprehensive qualitative and quantitative update to its existing FY 2009 risk assessment to identify programs susceptible to high risk of significant improper payments. NASA's risk assessment methodology is illustrated in Figure 1 below, along with a brief summary of steps and results.

Figure 1: NASA's Risk Assessment Methodology and Results

Determine Scope	Identify Programs Eligible for Assessment FY 2009	Analyze Risk Conditions	Prepare Risk Assessment
•Identified 84 distinct programs •Estimated maximum error rate of program disbursements at 12.5% •Materiality level of programs in scope set at $80M •The programs in scope covered $18.4 B in FY 2009 disbursements	•Identified 33 programs within assessment scope •Identified 8 programs that received ARRA funds •Non programmatic disbursements such as Institutions and Management also included under FY 2010 assessment scope	•Evaluated FY 2009 Audit Reports, Findings and Recommendations •Evaluated Financial Management trends in Internal Controls •Evaluated risk conditions including control environment, human capital risk and nature of payments.	•Updated Information based on intelligence gathered from NASA Financial Management Products and independent reviews •Populated Risk Assessment matrix with initial feedback. •Identified 5 programs susceptible to improper payments based on risk ratings.

(1) Determine Scope

To determine the scope of programs subject to the Risk Assessment, NASA prepared an initial selection based on the FY 2009 total disbursements; identifying 84 distinct programs. NASA generated and provided the disbursement totals for each program from its financial management system. The aggregate disbursement total was validated against NASA's SF-133, Report on Budget Execution and Budgetary Resources.

(2) Identify Programs Eligible for FY 2010 Assessment

A review of the 84 distinct programs was made to determine whether or not they meet the materiality thresholds for review. The materiality of disbursements is derived from an estimated error rate of 12.5 percent of program disbursements. Using this estimate, the materiality level of programs in scope was set at $80 million. The number of programs in scope was reduced to 33 based on the materiality of disbursements. NASA also developed a questionnaire of additional risk conditions that NASA's programs were evaluated against. The questionnaires were completed by Senior Management and selected Program personnel and captured data such as risk assessment scores, disbursement values, and estimated error rates.

(3) Analyze Risk Condition

The control environment, internal and external monitoring, human capital risk, programmatic risk, and nature of program payment risk factors were analyzed during the risk assessment. NASA also reviewed documents, including the Review of Open Audit Recommendations Affecting Recovery Act Activities (Report Number. IG-10-014: Assignment No. A-09-009-01) and the Government Accountability Office (GAO) report Improper Payments: Weaknesses in USAID's [U.S. Agency for International Development's] and NASA's Implementation of the Improper Payments Information Act and Recovery Auditing (GAO-08-77, November 9, 2007). NASA completed all work necessary to close the four open recommendations in the GAO report in FY 2010 and GAO indicated to NASA that the recommendations are closed. Among other documents, NASA also examined the report on NASA's Overall Assessment of Internal Control over Financial Reporting. Once this review and analysis was complete, the FY 2010 Risk Assessment was updated to reflect the NASA programs found to be susceptible to improper payments.

(4) Prepare Risk Assessment

The programs identified during FY 2010 are: Institutions and Management, International Space Station Mars Exploration, Space Shuttle Program, Constellation Systems, Earth Science Research, Earth Systematic Missions, Cosmic Origins and Space Communications. Together, these programs represent approximately 90 percent of the FY 2009 disbursements. Table 1 below provides the FY 2010 programs susceptible to improper payments. A score greater than 3.00 is deemed "high risk" per the NASA Risk Assessment Methodology.

Table 1: NASA Programs Identified as Susceptible to Improper Payments with respective risk rating

Program	Determined Risk After Testing in FY 2007	Determined Risk After Testing in FY 2008	Determined Risk After Testing in FY 2009	2010 Risk Assessment Rating	Selected for Testing FY 2010
Institutions and Management	Low	Low	Low	3.68	No
International Space Station	Low	Low	Low	3.41	No
Mars Exploration	Low	Low	Low	3.88	No
Space Shuttle Program	Low	Low	Low	3.20	No
Constellation Systems	N/A	Low	Low	3.68	Yes
Earth Science Research	N/A	Low	Low	3.74	Yes
Earth Systematic Missions	N/A	N/A	Low	3.98	Yes
Cosmic Origins	N/A	N/A	Low	4.16	Yes
Space Communications	N/A	N/A	N/A	3.01	Yes (New Program)

As shown in Table 1, based on testing results from previous years (FY 2007 to FY 2009), some programs initially identified during the FY 2010 risk assessment were deemed low risk as a result of the testing performed during the past 3 years and testing was not required during FY 2010. The following programs that received high risk ratings in FY 2010 but were actually tested and evaluated and were deemed to be actually low risk and do not require testing again in FY 2010 are:

- **Institutions and Management**
- **International Space Station**
- **Mars Exploration**
- **Space Shuttle Program**

Therefore, the following programs that were rated high risk were selected for the FY 2010 testing phase:

- **Constellation Systems**
- **Cosmic Origins**
- **Earth Science Research**
- **Earth Systematic Missions**
- **Space Communications**

Statistical Sampling Process

For each program selected for testing, NASA developed a statistically valid random sample of program payments, in accordance with OMB guidelines. NASA constructed a stratified, random sample to yield an estimate with a 90 percent confidence level with a margin of error of plus or minus 2.5 percent for each program. The sample was drawn from the universe of disbursements that occurred from October 1, 2008 through September 30, 2009. For each selected program undergoing an improper payment review, NASA developed samples for the following payment types: vendor payments; government purchase card transactions; and travel expenditures. A total number of 1,517 transactions were selected. Figure 2 below illustrates the overall sample design by total disbursements by program for FY 2010.

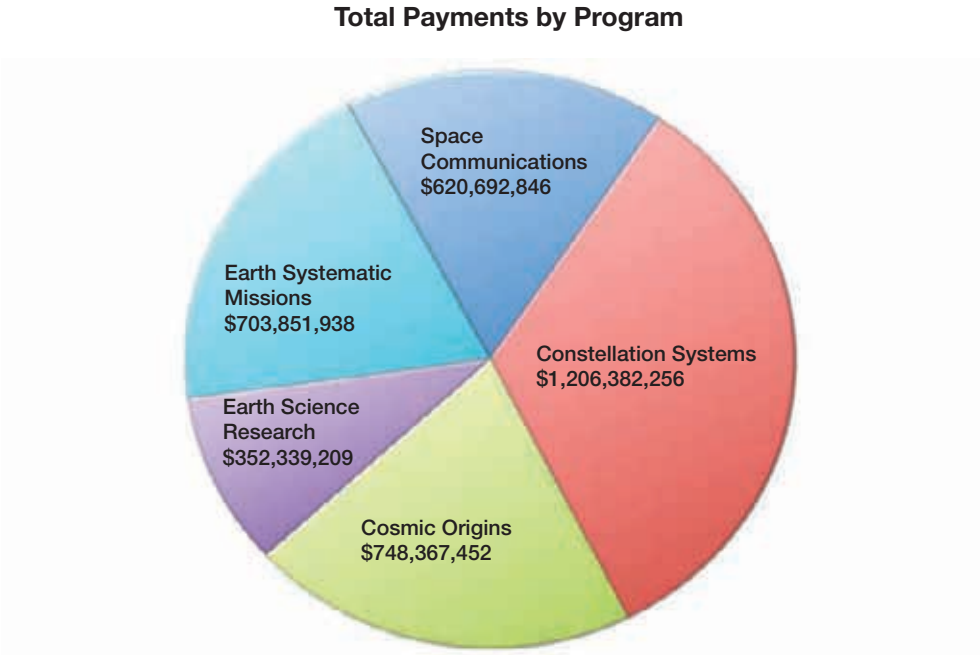


Figure 2: Sample Design by total disbursements by program for FY 2010

Description of Population and Sample Data

A random sample was selected for each of the five programs identified as susceptible to high risk of significant improper payments. Table 2 shows the number of transactions and dollar value by program for the payment population and sample.

Table 2: Transaction and dollar value by program and payment type (Population and Sample)

Program	Contracts		Travel		Purchase Cards	
	Population	Sample	Population	Sample	Population	Sample
Constellation Systems						
Transactions	34,821	368	24,855	8	23,232	5
Dollar Amount	$1,184,585,743	$368,399,761	$14,141,866	$10,500	$7,654,647	$2,390
Cosmic Origins						
Transactions	6,545	220	3,253	4	24,591	4
Dollar Amount	$742,842,581.00	$400,600,435.99	$2,862,326.21	$8,410.71	$2,662,544.95	$8,568.98
Earth Science Research						
Transactions	9,012	355	2,718	9	19,218	9
Dollar Amount	$347,630,350.00	$74,966,767.11	$2,309,848.24	$26,242.93	$2,399,010.95	$1,968.10
Earth Systematic Missions						
Transactions	9,493	306	4,584	5	18,849	4
Dollar Amount	$697,362,189.00	$294,791,060.70	$3,555,131.38	$6,226.27	$2,934,617.14	$10,852.25
Space Communications						
Transactions	4,792	217	1,986	2	3,372	1
Dollar Amount	$618,507,198.00	$352,867,063.10	$1,541,136.05	$1,940.84	$644,512.17	$210.94
Transaction Totals		**1466**		**28**		**23**

Conclusion

In total, NASA identified two (2) improper contract payments. The total payments are identified in Table 3 below:

Table 3: Improper payments by NASA program

Finding - Unauthorized Commitment		
Program	**Improper Payment Amount Over (Under)**	**# of Payments**
Earth Science Research	$29,159.84	1
Cosmic Origins	$7,167.00	1
Total	**$36,326.84**	**2**

As illustrated below, an extrapolation of the two payments over the entire universe resulted in $7,698,973 of estimated improper payments with an estimate percentage of 0.21% during the period October 1, 2008 through September 30, 2009. Both the improper payment percentage and the estimated amount of improper payments are not considered significant as defined by OMB A-123, Appendix C. Consequently, NASA is not required to submit a written corrective action plan; however, NASA will implement corrective actions in FY 2011 to further reduce its exposure to improper payments. Table 4 below shows the total payments by population, sample amount, and annual estimate of improper payments by program.

Table 4: Total Payments by Population, sample amount and annual estimate of improper payments by program

	Transactions		Dollars		FY 2010 Percentage Estimate of Improper Payments	FY 2010 Annual Estimate of Improper Payments
	Population	Sample	Population	Sample		
Constellation Systems	82,908	381	$1,206,382,256	$368,412,651	0.00%	$0
Cosmic Origins	34,389	228	748,367,452	400,617,416	0.53%	3,959,348
Earth Science Research	30,948	373	352,339,209	74,994,978	1.06%	3,739,625
Earth Systematic Missions	32,926	315	703,851,938	294,808,139	0.00%	0.00
Space Communications	10,150	220	620,692,846	352,869,215	0.00%	0.00
Totals	**191,321**	**1,517**	**$3,631,633,701**	**$1,491,702,399**	**0.21%**	**$7,698,973**

Recovery Audit

In accordance with the requirements of section 831 of the Defense Authorization Act of FY 2002, NASA performs recovery audits as part of its overall program of effective internal control over contract payments. In FY 2010 NASA performed a recovery audit focused on its FY 2008 disbursements.

In accordance with OMB guidance, agencies may determine to exclude classes of contracts and contract payments from recovery audit activities if the agency head determines that the recovery audits are inappropriate or not a cost-effective method for identifying and recovering improper payments. Consequently NASA does not include cost-type contracts in its assessment for recovery audits.

NASA engages an industry leader in recovery auditing under a contingency contract and the firm audited FY 2006 and FY 2007 disbursements in prior years. This year, FY 2008 disbursements were audited and the results are listed in the table below. The Recovery Audit of FY 2009 disbursements is underway.

Agency Component	Amount Subject to Review for FY 2008 Reporting	Actual Amount Reviewed and Reported FY 2008	Amounts Identified for Recovery FY 2008	Amounts Recovered FY 2008	Amounts Identified for Recovery Prior Years (PYs)	Amounts Recovered (PYs)	Cumulative Amounts Identified for Recovery (CY+ PYs)	Cumulative Amounts Recovered (CY + PYs)
NASA	$4,985,006,667	$4,985,006,667	$24,824	$9,728	$209,552	$206,281	$234,376	$216,009

The Agency has taken steps through the Improper Payment reviews and recovery audits to continue holding Agency managers accountable for reducing and recovering improper payments. The Recovery Audit process is monitored by headquarters to ensure compliance with NASA's Recovery Audit Guidance. In addition, all collection and disbursement functions are now centralized at the NASA Shared Services Center which ensures not only prompt recovery of overpayments, but an effective way to control and review all contract payments.

NASA has the infrastructure and information technology in place to reduce improper payments. There are no statutory or regulatory barriers limiting NASA's ability to reduce improper payments.

FY 2010 Inspector General Act Amendments Report

Background

The Inspector General Act Amendments of 1988 (P.L. 100-504), require that the head of each federal agency submit semi-annual reports to Congress on the actions taken in response to Office of Inspector (OIG) audit, evaluation, and inspection reports. Under the authority of the Reports Consolidation Act of 2000 (P.L. 106-531), the National Aeronautics and Space Administration (NASA) consolidates and annualizes the required semi-annual Inspector General Act Amendments reporting elements for inclusion in the annual Performance and Accountability Report (PAR).

Required agency reporting under the 1988 amendments includes:

1. Disclosure of OIG reports containing findings with monetary benefits (i.e., disallowed costs and funds put to better use):

- **on which management decisions were made during the reporting period;**
- **for which final management decisions have been made, but final management action is pending;**
- **for which final management action was taken during the reporting period, and;**
- **for which no final management action was taken during the reporting period.**

2. Disclosure of OIG audit reports issued in prior fiscal years for which final management action is pending, but not yet completed.

In addition to above statutory requirements, the Office of Management and Budget (OMB) has issued specific action requirements to federal agencies in their Circular No. A-50, "Audit Follow-up." These requirements include among other things that federal agencies ensure that final management decisions on audit recommendations are reached within six months after an OIG audit report is issued and that related corrective action associated with the final management decision begin as soon as possible.

The following definitions are provided to enhance the readability of NASA's FY 2010 Inspector General Act Amendments Report:

Final Management Decision is reached when management evaluates the OIG's findings and recommendations and determines whether or not to implement a proposed recommendation.

Final Management Action is the point in time when corrective action, taken by management in conjunction with a final management decision, is completed.

Corrective Action consists of remediation efforts on the part of management which are intended to mitigate an audit finding.

Questioned Costs are those identified by the OIG as being potentially unallowable or unallocable because of (a) an alleged violation of a provision of a law, regulation, contract, grant, cooperative agreement, or other agreement or document governing the expenditure of funds; (b) a finding that, at the time of the audit, such cost is not supported by adequate documentation; or (c) a finding that the expenditure of funds for the intended purpose is unnecessary or unreasonable.

Disallowed Costs are questioned costs that management has sustained or agreed should not be charged to the Government.

Funds to be Put to Better Use (FPTBU) are funds that could be used more efficiently if management implemented an audit recommendation. Efficiencies may result from: reductions in outlays; de-obligation of funds, or; costs not incurred by implementing recommended improvements related to operations of the agency, a contractor, or a grantee.

NASA's Audit Follow-up Program

NASA management is committed to ensuring timely and responsive final management decisions along with timely and complete final management action on audit recommendations issued by external auditors including the OIG. NASA management believes that audit follow-up is essential to improving the efficiency and effectiveness of NASA's programs, projects, and operations. In this regard, NASA has implemented a comprehensive program of audit liaison, resolution, and follow-up intended to ensure that audit recommendations issued by the OIG and the Government Accountability Office (GAO) are resolved and implemented in a timely, responsive, and effective manner.

NASA has designated the Office of Internal Controls and Management Systems (OICMS) as the Agency's lead for policy formulation, oversight, and functional leadership of NASA's audit liaison, resolution and follow-up program. OICMS administers related program activities through an agency-wide network of Audit Liaison Representatives (ALRs) who are responsible for executing audit liaison, resolution, and follow-up program activities. This network of ALRs, in conjunction with OICMS oversight, provides the organizational structure to support NASA's audit liaison, resolution, and follow-up program. Program activities are tracked, monitored and reported through the utilization of NASA's Audit and Assurance Information Reporting System (AAIRS). AAIRS is a web-based tracking and reporting tool utilized by OICMS and NASA ALRs to monitor key activities and milestones associated with audits performed by the OIG and GAO.

In accordance with requirements delineated in OMB Circular A-50, OICMS monitors audit recommendations issued by the OIG to ensure that a final management decision is reached within six months of the issuance of a final audit report. A final management decision consists of either agreeing to implement an OIG recommendation; agreeing to implement a portion of an OIG recommendation, or; declining to implement an OIG recommendation. In those instances where agreement between the OIG and NASA management cannot be reached, a final management decision will be sought from NASA's Audit Follow-up Official (AFO).

Once a final management decision has been made to either implement or partially implement an OIG audit recommendation, corrective action on the part of management is pursued as rapidly as possible, in accordance with provisions of OMB Circular A-50. On occasion, the corrective action associated with a final management decision spans several fiscal years. This may be due to the complexity of the planned corrective action (which often times consists of the design, implementation, and testing of related systems or sub-systems); or the development, concurrence and review process associated with the issuance of NASA policy and/or procedural requirements. In spite of these constraints, NASA management continues to aggressively pursue the implementation of agreed-upon corrective action relating to audit recommendations issued by the OIG.

The Inspector General Act Amendments of 1988 require that heads of federal agencies report on actions taken, or remaining to be taken, in response to OIG audit reports containing monetary findings. The amendments also require that management disclose those OIG audit reports for which a final management decision had been made in a prior reporting period, but where final management action is still pending. In addition to the statutory reporting requirements delineated in the Inspector General Act Amendments of 1988, OMB Circular A-50, requires that final management decisions on OIG audit recommendations be made within six months of the issuance of a final audit report. NASA's reporting in conjunction with the requirements of the Inspector General Act Amendments of 1988 and OMB Circular A-50 follows:

FY 2010 Audit Follow-up Results

1. OIG Audit Reports with Monetary Findings

During FY 2010, the OIG issued an audit report containing one monetary finding with questioned costs in the amount of $23,000[1]. Subsequent to the OIG's identification of questioned costs, NASA management sustained a total of $23,059 in disallowed costs associated with contract payment calculation errors. Final management action taken in response to the $23,059 is disallowed costs consisted of recovering the full amount prior to the end of the current fiscal year.

[1]Review of NASA's Microgravity Flight Services (IG-10-015), dated June 18, 2010. OIG questioned costs in the amount of $23,000 were subsequently sustained as disallowed costs in the amount of $23,059.

The OIG issued one additional audit report containing a monetary finding consisting of $12,019[2] in questioned costs, however those questioned costs were not sustained as disallowed costs, consequently no recovery action on the part of management was required, nor was any taken.

There were no prior year OIG reports with monetary findings requiring final management action at the beginning of FY 2010. As a result of the final management action taken with respect the $23,059 noted above, there were no OIG reports with monetary findings pending final management decision or final management action at the end of FY 2010 (see Table 1).

Table 1: Summary of Disallowed Costs and Funds to Be Put to Better Use (For the Year Ended September 30, 2010)

Category	Disallowed Costs		Funds to be Put To Better Use	
	Number of Reports	Dollars	Number of Reports	Dollars
1. Reports pending final management action at the beginning of the reporting period	0	$0	0	$0
2. Plus: Reports on which management decisions were made during the reporting period	1	$23,059	0	$0
3. Total reports pending final action during the reporting period (1+2)	1	$23,059	0	$0
4. Reports on which final action was taken during the reporting period	1	$23,059	0	$0
5. Audit reports pending final action at the end of the reporting period (3-4)	0	$0	0	$0

2. Prior-Year OIG Reports Pending Completion of Final Management Action

As of September 30, 2010, there were 12 OIG audit reports issued in prior fiscal years containing a total of 34 recommendations on which a final management decision had been made, but final management action was still pending (see Table 2).

The nature of the final management action associated with the 34 open and outstanding audit recommendations can be broken down into four broad categories namely: (1) Internal Monitoring/Program Review for Compliance; (2) Development/Revision of Policy; (3) Development/Execution of Training Activities, and; (4) System Enhancements/ Updates.

By way of comparison, as of September 30, 2009, there were 18 OIG audit reports containing 38 recommendations on which final management decisions were made in prior years, but final management action was still pending. For the five year period ended September 30, 2010, the number of OIG audit recommendations pending final management action one year or more after issuance of a final audit report ranged between 34 and 53.

[2]Final Memorandum on the Review of NASA's Payment of Task Order 389 to United Launch Alliance (IG-10-010), dated June 1, 2010.

Table 2: Summary of OIG Audit Reports Pending Final Management Action One Year or More After Issuance of a Final Report (As of September 30, 2010)				
Report No.		No. of Recommendations		
Report Date	Report Title / (Report Number)	Open	Closed	Total
IG05016 05-12-05	NASA's Information Technology Vulnerability Assessment Program	1	3	4
IG06007 03-17-06	NASA's Implementation of Patch Management Software is Incomplete	1	1	2
IG07014 06-19-07	Controls Over the Detection, Response and Reporting of Network Security Incidents Needed Improvement at Four NASA Centers Reviewed	4	4	8
IG07029 09-18-07	Final Memorandum on Audit of Education and Training Grants	1	4	5
IG08004 12-11-07	Final Memorandum on NASA's Accounting for Real Property Leased to Other Entities	4	0	4
IG08005 12-11-07	Final Memorandum on NASA's Accounting for Capitalized Real Property Designated as Inactive	4	0	4
IG08025 9-19-08	(Redacted) Center's Security Program Needed Improvement	4	4	8
IG09003 11-13-08	Final Memorandum on the Review of NASA Stolen Property at Goddard Space Flight Center and Marshall Space Flight Center	1	4	5
IG09015 4-27-09	NASA's Process for Providing Personal Identity Verification (PIV) Cards Were Not Completely Effective in Meeting Federal Requirements	3	3	6
IG09018 7-14-09	Improvements Needed in NASA's Oversight and Monitoring of Small Business Contractor Transfers of Export-Controlled Technologies	3	1	4
IG09017 7-27-09	Opportunities to Improve the Management of the Space Flight Awareness Honoree Launch Conference Event	1	0	1
IG09022 9-25-09	NASA Should Reconsider The Award Evaluation Process And Contract Type For The Operation Of The Jet Propulsion Laboratory	7	1	8
12	**Totals**	**34**	**25**	**59**

3. Final Management Decisions Not Made Within Six Months of a Report Date

During FY 2010, the OIG issued a total of 22 audit reports containing 83 recommendations addressed to NASA. A final management decision on each of the 83 audit recommendations issued in FY 2010 was made within six months of the respective final report dates. As of September 30, 2010, there were no OIG audit recommendations for which a final management decision had not been made within six months of the final report date.

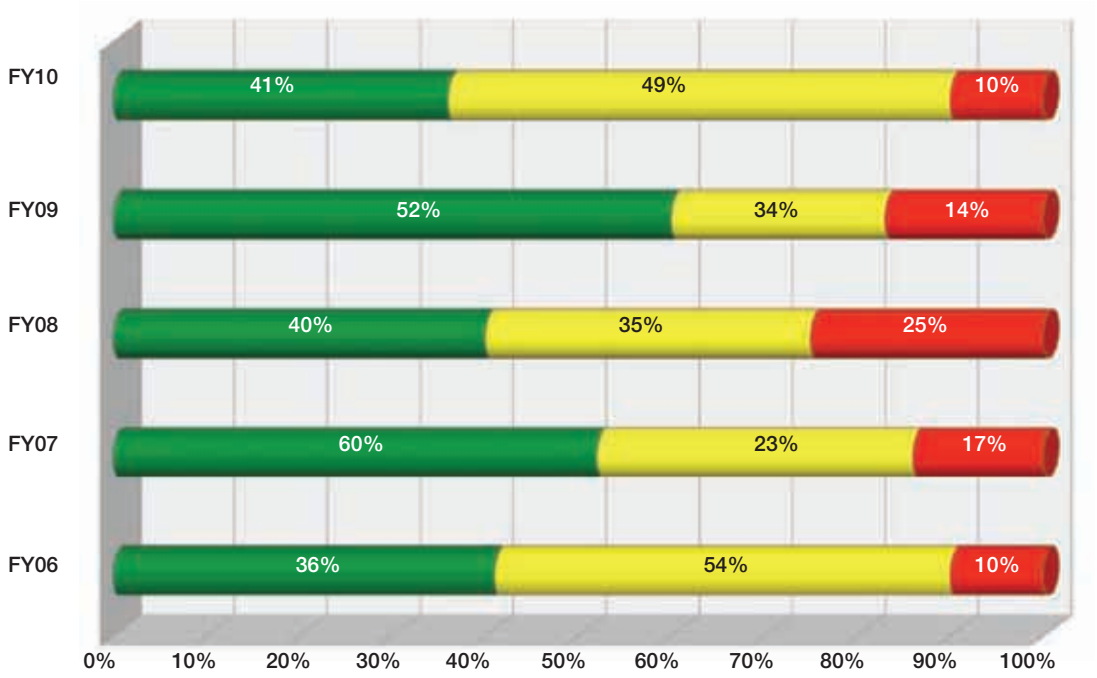
For comparative purposes, for the fiscal year ended September 30, 2009, NASA reported no outstanding final management decisions pending more than six month after the issuance of a final OIG audit report. Furthermore, for the five-year period ended September 30, 2010, no final management decision on any OIG audit recommendation was made more than six months after issuance of a final OIG audit report.

4. Audit Recommendation Closure Efficiency

During FY 2010, 76 OIG-issued audit recommendations, including 64 recommendations issued in prior fiscal years, were closed based on responsive final management action. Of the 76 recommendations closed in FY 2010, forty-one percent (31 recommendations) were closed within one year of the issuance of the associated audit report, while ninety percent (68 recommendations) were closed within two years of the issuance of the associated audit report.

In FY 2009, fifty-two percent (58 recommendations) of OIG audit recommendations were closed with one year of the issuance of the associated audit report, and eighty-six percent (96 recommendations) were closed within two years of the issuance of the associated audit report. For the five year period ended September 30, 2010, an average of 46 percent of OIG-issued audit recommendations were closed within one year of the final issuance of the associated audit report, while an average of 85 percent of OIG-issued audit recommendations were closed within two years of the issuance of the associated audit report (see Table 3).

Table 3: Closure Efficiency: OIG Recommendations FY 2006–FY 2010



	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
< 1 year after report	36%	60%	40%	52%	41%
> 1 year < 2 years after report	54%	23%	35%	34%	49%
> 2 years after report	10%	17%	25%	14%	10%

As previously noted, NASA's completion of corrective action in response to OIG audit recommendations is contingent upon a variety of factors including the complexity of the planned corrective actions and available resources. Despite these constraints, NASA management is committed to the improvement of Agency activities as identified by the OIG in their audit reports and associated recommendations.

Summary of Financial Statement Audit and Management Assurances

The following tables summarize the Agency's FY 2010 Financial Statement Audit and Management Assurances. Table 1 summarizes the status of the FY 2009 prior year material weaknesses identified by the Financial Statement Auditor. Table 2 summarizes the status of the FY 2009 prior year material weaknesses identified by NASA Management.

Table 1: Summary of Financial Statement Audit

Audit Opinion Restatement	Qualified Yes				
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Ending Balance
Controls Over Legacy Property, Plant, and Equipment	1	0	1	0	0
Total Material Weaknesses	**1**	**0**	**1**	**0**	**0**

Table 2: Summary of Management Assurances

Effectiveness of Internal Control Over Financial Reporting (FMFIA 2)						
Statement of Assurance	Unqualified					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Controls Over Legacy Property, Plant, and Equipment	1	0	1	0	0	0
Total Material Weaknesses	**1**	**0**	**1**	**0**	**0**	**0**
Effectiveness of Internal Control Over Operations (FMFIA 2)						
Statement of Assurance	Unqualified					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
None	0	0	0	0	0	0
Total Material Weaknesses	**0**	**0**	**0**	**0**	**0**	**0**
Conformance With Financial Management Systems Requirements (FMFIA 4)						
Statement of Assurance	Systems Conform					
Non-Conformances	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Total Non-Conformances	**0**	**0**	**0**	**0**	**0**	**0**
Compliance With Federal Financial Management Improvement Act (FFMIA)						
Overall Substantial Compliance 1. System Requirements met? 2. Accounting Standards met? 3. USSGL at Transaction Level met?	Agency Yes			 Yes Yes Yes	Auditor Yes	

Federal Financial Management Systems Strategy

During the past decade NASA strategically modernized its integrated financial management system. The strategy led to a re-engineered financial management system infrastructure using industry "best practices" that deploys enabling technology to provide management information on a real time basis. NASA has integrated the core financial system with procurement, human capital, travel, and asset management, for improved reporting and analysis. The core financial system accounting platform includes, the Standard General Ledger, Accounts Receivable, Accounts Payable, Purchasing, Cost Management, Materials Management, Facilities Maintenance and Asset Accounting. The NASA Enterprise Applications Competency Center (NEACC) provides centralized operations.

NASA's core financial system supports its budget formulation, execution, and funds control, consistent with the requirements of OMB Circular A-11, Preparation, Submission, and Execution of the Budget. NASA consistently provides timely and reliable budget and other financial reports for management throughout the agency, using information generated from its financial system. Agency executives and operating managers rely on this budget and financial information for decision making.

NASA's core financial system is supported by ancillary feeder systems with common data elements that adhere to government-wide standards for reporting. A comprehensive set of internal controls are in place to maintain integrity and reliability of the information generated by the system. NASA's independent audit of the FY 2010 financial statements has found no material weaknesses or misstatements.

NASA's internal control compliance framework, the Comprehensive Compliance Strategy (CCS), serves as the basis for ensuring effective agency-wide financial management, financial reporting, and financial control. It encompasses guiding principles for executing effective financial management functions and activities with internal control and compliance solutions inherently embedded in the process. Monitoring and oversight of the effectiveness of the CCS is conducted through the Continuous Monitoring Program (CMP) as well as through ongoing Evaluation Monitoring and Testing (EMT) periodic compliance reviews. The EMT reviews provide another level of management assurance regarding compliance with CCS, while at the same time serving as a review program used to periodically measure the effectiveness of CMP and validate the operating effectiveness of internal controls over financial reporting.

In fiscal year 2010, NASA's comprehensive set of internal controls safeguarded its assets from loss, misappropriation, or destruction. Internal control activities are monitored monthly for operating effectiveness. Identified deficiencies are corrected timely and, existing controls are strengthened as necessary. As a result, there are no known instances of asset loss, misappropriation, or destruction attributable to the financial system. NASA's integrated financial management system is in substantial compliance with Federal Financial Management Information Act (FFMIA) requirements.

NASA FY 2010 Public Law 111-117 Undisbursed Balances in Expired Grant Accounts

NASA monitors and tracks grants undisbursed balances in expired accounts through a monthly review of internal control activities designed to identify undisbursed balances in expired accounts. The Continuous Monitoring Program (CMP) ensures ongoing review and validation of financial data and the effectiveness of internal controls over the entire financial management process, including grants. When grants undisbursed balances in expired accounts are identified, appropriate action is taken to ensure optimum use of grant resources.

NASA generates financial management reports to aid in the tracking and monitoring of undisbursed amounts. An aging report of open obligations is generated on a monthly basis to determine the last day activity occurred. For open obligations in which no activity has occurred in a six month period and/or there is no supporting documentation, further review is performed to determine the validity of obligation balances and the existence of valid source documentation. Additionally, further analysis is performed to determine if funds can be de-obligated. If obligations are valid, the aging reports are updated to reflect that obligations have been confirmed with procurement as valid.

NASA will continue to track undisbursed balances in expired grant accounts through its monthly review of internal control activities designed to identify funds for de-obligation. This involves the continuous monitoring of undisbursed balances, identifying balances that should be de-obligated, and performing timely close-out of grants and other activities. Additionally, NASA's financial management and procurement offices will continue to collaborate in monitoring and tracking undisbursed balances.

Currently, NASA does not have undisbursed balances in expired accounts that may be returned to the Treasury of the United States. The following chart reflects the total number and dollar amount of undisbursed grants in expired appropriations. All amounts have been obligated to a specific project.

Year	Total Number of Expired Grants	Total Amount of Expired Grants (In Millions of Dollars)
2007	4,462	$175
2008	2,077	$124
2009	2,105	$58

Missions at a Glance

Aeronomy of Ice in the Mesosphere (AIM) is a two-year mission to study Polar Mesospheric Clouds (PMCs), Earth's highest clouds, which form an icy membrane 50 miles above Earth's surface at the edge of space. The primary goal of AIM is to explain why PMCs form and what causes changes in their behavior. *http://www.nasa.gov/mission_pages/aim/index.html*

Aqua is a major international Earth Science satellite mission. Launched on May 4, 2002, the satellite has six different Earth-observing instruments on board and is named for the mission's focus on water in the Earth system. Aqua collects approximately 89 gigabytes of data daily. *http://www.nasa.gov/mission_pages/aqua/index.html*

Aquarius is a focused satellite mission that measures global sea surface salinity. After its launch in 2011, it will provide a global view of salinity variability to enhance climate studies. NASA and the Space Agency of Argentina are currently developing Aquarius. *http://aquarius.gsfc.nasa.gov/*

Ares 1 is an in-line, two-stage rocket. Ares I was designed to launch Orion, the Crew Exploration Vehicle, into low Earth orbit for missions to the ISS and other destinations as part of the Constellation Program. *http://www.nasa.gov/mission_pages/constellation/ares/aresl/index.html*

Aura was launched July 15, 2004. The Aura satellite studies Earth's ozone, air quality, and climate. *http://www.nasa.gov/mission_pages/aura/main/index.html*

Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) uses a cloud profiling radar system to study the role that clouds and airborne particles play in regulating Earth's weather, climate, and air quality. CALIPSO combines an active lidar instrument with passive infrared and visible imagers to probe the structure and properties of thin clouds and aerosols over the globe. NASA launched CALIPSO on April 28, 2006 with the CloudSat satellite. *http://www.nasa.gov/mission_pages/calipso/main/index.html*

Cassini/Huygens was launched on a Titan IV rocket in October 1997, carrying NASA's Cassini orbiter and the European Space Agency's Huygens probe. The Cassini/Huygens mission is providing data for a detailed study of Saturn, its rings, icy satellites, magnetosphere, and the environment of Titan. *http://saturn.jpl.nasa.gov/index.cfm*

Chandrayaan-1 was an Indian Space Research Organization (ISRO) mission to study the Moon, launched on October 22, 2008. It was an international mission, with payloads from Europe as well as the United States. NASA's contribution included the Moon Mineralogy Mapper (M3) instrument, designed to look for lunar mineral resources. Despite loss of contact only a year into its planned two-year mission, Chandrayaan-1 played a key role in the groundbreaking 2009 discovery of water molecules on the Moon. *http://www.isro.org/chandrayaan/htmls/home.htm*

Chandra X-ray Observatory, launched and deployed by Space Shuttle *Columbia* on July 23, 1999, is the most sophisticated X-ray observatory built to date. Since Earth's atmosphere absorbs the vast majority of X-rays, they are not detectable from Earth-based telescopes. Chandra is advancing knowledge about the high-energy universe. *http://science.nasa.gov/missions/chandra/*

Coupled Ion Neutral Dynamics Investigation (CINDI), launched on April 16, 2008, studies the elements that influence space weather near Earth's equator. *http://www.nasa.gov/mission_pages/cindi/*

Climate Absolute Radiance and Refractivity Observatory (CLARREO) is a climate-focused mission, currently planned to launch in 2017. Measurements derived from CLARREO will be used to detect climate trends and to test, validate, and improve climate prediction models. *http://clarreo.larc.nasa.gov/*

The **Constellation Program** was intended to create a new generation of spacecraft for human spaceflight, consisting primarily of the Ares I and Ares V launch vehicles, the Orion crew capsule, the Earth Departure Stage, and the Altair Lunar Lander. *http://www.nasa.gov/mission_pages/constellation/main/index.html*

The **Deformation, Ecosystem Structure, and Dynamics of Ice (DESDynI)** mission's objectives are to: determine the likelihood of earthquakes, volcanic eruptions, and landslides; predict the response of ice sheets to climate change and impact on the sea level; characterize the effects of changing climate and land use on species habitats and carbon budget; and monitor the migration of fluids associated with hydrocarbon production and groundwater resources. DESDynI is currently planned to launch in 2017. *http://desdyni.jpl.nasa.gov/*

Earth Observing-1 (EO-1) developed and validated a number of instrument and spacecraft bus breakthrough technologies designed to enable the development of future earth imaging observatories. EO-1 was launched on November 21, 2000. http://eo1.gsfc.nasa.gov/

EPOXI combines two exciting science investigations in a new mission that re-uses the Deep Impact spacecraft already in orbit around the Sun. The Extrasolar Planet Observation and Characterization (EPOCh) investigation observed stars with giant planets, and the Deep Impact eXtended Investigation (DIXI) of comets observed comet 103P/Hartley 2 during a close flyby in November 2010. *http://www.nasa.gov/mission_pages/epoxi/index.html*

The **Fermi Gamma-ray Space Telescope** explores the most extreme environments in the universe. The mission is a partnership between NASA, the U.S. Department of Energy, and institutions in France, Germany, Japan, Italy and Sweden. Fermi was launched June 11, 2008. *http://fermi.gsfc.nasa.gov/*

Glory is a low Earth orbit scientific research spacecraft that will collect data on Earth's atmosphere and climate system to determine if temperature increase and climate change are natural events or the effects of human influence. *http://glory.gsfc.nasa.gov/*

Geostationary Operational Environmental Satellite (GOES)/Polar Operational Environmental Satellite (POES) is composed of two geostationary satellites and two polar orbiting satellites that operate in pairs to monitor the east and west coasts separately. They provide real-time weather data for short-term weather forecasting of severe weather, space environment monitoring, and research and development. The polar orbiting satellites provide global long-range weather forecasting, ensuring that non-visible data are no more than six hours old. *http://goespoes.gsfc.nasa.gov/goes/index.html*

The **Global Hawk** campaigns are the first Earth Science missions to be conducted using a Global Hawk unmanned aircraft system. Ten specialized instruments were installed in the aircraft to explore the trace gases, aerosols, and dynamics of the upper troposphere and lower stratosphere. The Pacific campaign is the first of its scientific missions. *http://www.nasa.gov/centers/dryden/research/GloPac/index.html*

Global Precipitation Measurement (GPM) is one of the next generation of satellite-based Earth science missions that will study global precipitation such as rain, snow, and ice. *http://science.nasa.gov/missions/gpm/*

Gravity Recovery and Climate Experiment (GRACE) accurately maps variations in Earth's gravity field. GRACE launched on March 17, 2002, sending two identical spacecraft into a polar orbit about 310 miles above the Earth. *http://science.nasa.gov/missions/grace/*

Gravity Recovery and Interior Laboratory (GRAIL) is a duel satellite mission with high-quality gravity mapping capabilities that will be launched to the Moon to determine the structure of the lunar interior, from crust to core, and to advance understanding of the Moon's thermal evolution. *http://science.nasa.gov/missions/grail/*

Herschel is a European Space Agency mission, with participation from ten countries, including the United States. The Herschel Space Observatory is a space-based telescope that will study the universe by the light of the far-infrared and submillimeter portions of the spectrum. Herschel was launched on May 14, 2009. *http://www.nasa.gov/mission_pages/herschel/index.html*

Hinode is a Japanese mission developed, launched and operated by Institute for Space and Astronautical Science/Japan Aerospace Exploration Agency (ISAS/JAXA), in partnership with NASA and other entities. Its mission is to measure solar magnetic fields. Hinode launched on September 22, 2006. *http://www.nasa.gov/mission_pages/hinode/index.html*

Hubble Space Telescope, launched on April 1990, is a large, space-based observatory which has revolutionized astronomy by providing unprecedented deep and clear views of the universe, ranging from the solar system to extremely remote fledgling galaxies that began forming not long after the Big Bang 13.7 billion years ago. *http://hubble.nasa.gov/*

Interstellar Boundary Explorer (IBEX), launched October 19, 2008, is a small satellite, about the size of a bus tire. IBEX is the first mission designed to map the entire region of the boundary of the Solar System while circling the Earth. *http://science.nasa.gov/missions/ibex/*

IceBridge, a six-year NASA mission, is the largest airborne survey of Earth's polar ice ever flown. Data collected during IceBridge will help scientists bridge the gap in polar observations between NASA's Ice, Cloud and Land Elevation Satellite (ICESat-I)—in orbit since 2003—and ICESat-2, planned for late 2015. *http://www.nasa.gov/mission_pages/icebridge/mission/index.html*

Ice, Cloud, and Land Elevation Satellite (ICESat)-1, launched in February 2004, is the benchmark Earth Observing System mission for measuring ice sheet mass balance, cloud and aerosol heights, as well as land topography and vegetation characteristics. ICESat I has provided multi-year elevation data needed to determine ice sheet mass balance as well as cloud property information, especially for stratospheric clouds common over polar areas. ICESat stopped collecting science data in 2009, and it will be replaced by ICESat II, currently in formulation. *http://icesat.gsfc.nasa.gov/icesat/*

Ice, Cloud, and Land Elevation Satellite (ICESat)-2 is the second generation of the orbiting laser altimeter ICESat, scheduled for launch in late 2015. *http://icesat.gsfc.nasa.gov/icesat2/*

The **International Space Station (ISS)** was begun in 1998 and will be completed by 2011. Scientists will continue daily research operations in its microgravity environment that spans several sciences, enhancing knowledge in the fields of biology, human biology, physics, astronomy, and meteorology. It is also a testbed for space exploration technologies and capabilities. *http://www.nasa.gov/mission_pages/station/main/index.html*

Jason-1, launched on December 7, 2001, is an oceanography mission to monitor global ocean circulation, improve global climate predictions, and monitor events such as El Niño conditions and ocean eddies. *http://sealevel.jpl.nasa.gov/*

Jason-2/Ocean Surface Topography Mission (OSTM), which launched June 20, 2008, follow the ocean surface topography measurements of TOPEX/Poseidon (T/P) and the Jason-1 mission, and extends the time series of observations to two decades. *http://sealevel.jpl.nasa.gov/missions/ostmjason2/*

Juno will significantly improve understanding of the formation, evolution, and structure of Jupiter. It will answer critical science questions about Jupiter, as well as provide key information to dramatically enhance present theories about the early formation of the solar system. *http://science.nasa.gov/missions/juno/*

The **James Webb Space Telescope (JWST)** is a large, infrared-optimized space telescope that will find the first galaxies that formed in the early universe. It will peer through dusty clouds to see stars forming planetary systems. *http://science.nasa.gov/missions/jwst/*

Kepler, launched on March 6, 2009, is surveying the local region of the Milky Way galaxy to discover hundreds of Earth-size and smaller planets in or near the habitable zone and determine the fraction of the hundreds of billions of stars in the galaxy that might have such planets. *http://www.nasa.gov/mission_pages/kepler/main/index.html*

Lunar CRater Observation and Sensing Satellite (LCROSS) launched with LRO on June 18, 2009. The main LCROSS mission objective is to confirm the presence or absence of water ice in a permanently shadowed crater near a lunar polar region. *http://www.nasa.gov/lcross/*

The **Landsat Data Continuity Mission (LDCM)** follows the Landsat mission and provides continuous satellite acquisition of high-resolution multispectral data of Earth's surface on a global basis. LDCM is a collaboration between NASA and the U.S. Geological Survey. The data from the Landsat spacecraft constitute the longest record of the Earth's continental surfaces as seen from space, unmatched in quality, detail, coverage, and value. *http://ldcm.nasa.gov/*

The **Lunar Reconnaissance Orbiter (LRO)** mission objectives are to find safe landing sites on the Moon, locate potential resources, characterize the radiation environment, and demonstrate new technology. LRO was launched on June 18, 2009, along with LCROSS. *http://www.nasa.gov/mission_pages/LRO/main/index.html*

The **Mars Exploration Rovers, "Spirit"** and **"Opportunity**," were launched on June 10 and July 7, 2003. Primary among the mission's scientific goals is to search for and characterize a wide range of rocks and soils that hold clues to past water activity on Mars. *http://www.nasa.gov/mission_pages/mer/index.html*

Mars Express is a European Space Agency mission designed as a low-cost, fast-track effort. Countries involved include France, Germany, Great Britain, Ireland, Italy, the Netherlands, Norway, Russia, Sweden, Spain, Japan, and the United States. Mars Express launched June 2, 2003. The seven instruments on the orbiter are currently making observations at Mars. *http://marsprogram.jpl.nasa.gov/express/*

Mars Odyssey is mapping the mineralogy and morphology of the Martian surface. *http://mars.jpl.nasa.gov/odyssey/index.cfm*

The **Mars Atmosphere and Volatile EvolutioN (MAVEN)** mission will provide the first direct measurements ever taken to address key scientific questions about Mars' evolution. Mars once had a denser atmosphere that supported the presence of liquid water on the surface. As part of a dramatic climate change, most of the Martian atmosphere was lost. MAVEN will make definitive scientific measurements of present-day atmospheric loss that will offer clues about the planet's history. *http://www.nasa.gov/mission_pages/maven/main/index.html*

Magnetospheric Multiscale (MMS) is a Solar-Terrestrial Probe mission that will be comprised of four identically instrumented spacecraft. It will use Earth's magnetosphere as a laboratory to study the microphysics of three fundamental plasma processes: magnetic reconnection, energetic particle acceleration, and turbulence. *http://science.nasa.gov/missions/mms/*

The **Mars Reconnaissance Orbiter (MRO)**, launched August 12, 2005, is searching for evidence that water persist on the surface of Mars. *http://science.nasa.gov/missions/mars-reconnaissance-orbiter/*

The **Mars Science Laboratory (MSL)** is a large, roving laboratory that will collect and analyze dozens of soil and rock samples while exploring the planet with greater range than any previous Mars rover. As planned, the robotic laboratory will carry the most advanced payload of scientific gear ever used on Mars' surface, a payload more than 10 times as massive as payloads on earlier Mars rovers. *http://science.nasa.gov/missions/msl/*

Nuclear Spectroscopic Telescope Array (NuSTAR) will search for black holes, map supernova explosions, and study the most extreme active galaxies. *http://www.nustar.caltech.edu/*

The **Orbiting Carbon Observatory (OCO)-2** is based on the original OCO mission that failed to reach orbit in 2009 and is designed to enable more reliable predictions of climate change. *http://oco.jpl.nasa.gov/index.cfm*

Orion, also known as the Crew Exploration Vehicle, was NASA's next-generation spacecraft for human spaceflight. Orion had three main components—the crew module (capsule), service module/spacecraft adapter, and launch abort system. *http://www.nasa.gov/mission_pages/constellation/orion/index.html*

The **Radiation Belt Storm Probes (RBSP)** mission will explore the Sun's influence on the Earth and near-Earth space by studying the planet's radiation belts. The two spacecraft will measure the particles, magnetic and electric fields, and waves that fill geospace and provide new knowledge on the dynamics and extremes of the radiation belts. *http://rbsp.jhuapl.edu/*

Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI) combines high-resolution imaging in hard X-rays and gamma rays with high-resolution spectroscopy, so that a detailed energy spectrum can be obtained at each point of the image. Its primary scientific objective is to understand processes that take place in the magnetized plasmas of the solar atmosphere during a flare: impulsive energy release; particle acceleration; and particle and energy transport. It launched on February 2, 2002. *http://hesperia.gsfc.nasa.gov/hessi/objectives.htm*

The **Solar Dynamics Observatory (SDO)** is designed to help understand the Sun's influence on Earth and near-Earth space by studying the solar atmosphere. SDO launched on February 11, 2010. *http://www.nasa.gov/mission_pages/sdo/main/index.html*

The **Soil Moisture Active-Passive (SMAP)** mission will use a combined radiometer and high-resolution radar to measure Earth's surface soil moisture and freeze-thaw state. Direct measurements of soil moisture and freeze/thaw state are needed to improve understanding of regional water cycles, ecosystem productivity, and processes that link the water, energy, and carbon cycles. *http://science.nasa.gov/missions/smap/*

Solar and Heliospheric Observatory (SOHO), launched on December 2, 1995, is a project of international collaboration between European Space Agency and NASA to study the Sun from its deep core to the outer corona and the solar wind. *http://www.nasa.gov/mission_pages/soho/index.html*

Solar Probe Plus will come closer to the Sun than any spacecraft has ever flown. This mission will study the streams of charged particles the Sun hurls into space from inside the Sun's corona - its outer atmosphere - where the processes that heat the corona and produce solar wind occur. *http://solarprobe.jhuapl.edu/index.php*

The **Space Shuttle** is the most complex machine ever built and its capacity is instrumental in building the International Space Station. *http://www.nasa.gov/mission_pages/shuttle/main/index.html*

Spitzer Space Telescope launched August 25, 2003. Spitzer obtained images and spectra by detecting the infrared energy, or heat, radiated by objects in space. Most of this infrared radiation is blocked by Earth's atmosphere and cannot be observed from the ground. *http://www.nasa.gov/mission_pages/spitzer*

Solar Terrestrial Relations Observatory (STEREO), launched in October 2006, is providing a unique and revolutionary view of the Sun–Earth system. The two observatories, one ahead of Earth in its orbit, the other trailing behind, trace the flow of energy and matter from the Sun to Earth. *http://www.nasa.gov/mission_pages/stereo/main/index.html*

The **Stratospheric Observatory for Infrared Astronomy (SOFIA)** is an airborne observatory that will complement the Hubble, Spitzer, Herschel and James Webb space telescopes, as well as major Earth-based telescopes. SOFIA is a joint program by NASA and DLR Deutsches Zentrum fur Luft- und Raumfahrt (German Aerospace Center). *http://www.nasa.gov/mission_pages/SOFIA/index.html*

Terra is a multi-national, multi-disciplinary partnership mission between the U.S., Canada and Japan. On February 24, 2000, Terra began collecting what will ultimately become a new, 15-year global data set on which to base scientific investigations of Earth. Terra carries five state-of-the-art sensors that have been studying the interactions among the Earth's atmosphere, lands, oceans, and radiant energy. *http://www.nasa.gov/mission_pages/terra/index.html*

The **Tracking and Data Relay Satellite (TDRS)** is the communication satellite component of the Tracking and Data Relay Satellite System, which provides tracking and data acquisition services between low Earth orbiting spacecraft and control and/or data-processing facilities. The system is capable of transmitting to and receiving data from spacecraft over at least 85 percent of the spacecraft's orbit. The first TDRS was launched in 1983 on the Space Shuttle *Challenger*'s first flight, STS-6. *http://nssdc.gsfc.nasa.gov/multi/tdrs.html*

Time History of Events and Macroscale Interactions during Substorms (THEMIS), launched in February 2007, aims to resolve one of the oldest mysteries in space physics: to determine what physical process in near-Earth space initiates the violent eruptions of the aurora that occur during sub-storms in Earth's magnetosphere. *http://www.nasa.gov/mission_pages/themis/mission/index.html*

The **Tropical Rainfall Mapping Mission (TRMM)** is a joint mission between NASA and the Japan Aerospace Exploration Agency (JAXA) to monitor and study tropical rainfall. The satellite was launched on November 27, 1997 from the Tanegashima Space Center in Tanegashima, Japan. *http://trmm.gsfc.nasa.gov/*

The **Voyager 1** and **2** spacecraft continue exploring in their 33rd year after their 1977 launches. They each are much farther away from Earth and the Sun than Pluto. Voyager 1 and 2 are now in the "Heliosheath"—the outermost layer of the heliosphere where the solar wind is slowed by the pressure of interstellar gas. Both spacecraft are still sending scientific information about their surroundings through the Deep Space Network (DSN). *http://www.nasa.gov/mission_pages/voyager/index.html*

The **Wide-field Infrared Survey Explorer (WISE)** will scan the entire sky in infrared light. Among the objects WISE will study are asteroids, the coolest and dimmest stars, and the most luminous galaxies. WISE launched on December 14, 2009. *http://www.nasa.gov/mission_pages/WISE/main/index.html*

Wilkinson Microwave Anistropy Probe (WMAP) is a NASA Explorer mission that launched June 2001 to make fundamental measurements of cosmology, the study of the properties of the universe as a whole. WMAP has been stunningly successful, producing a new Standard Model of Cosmology. WMAP continues to collect high-quality scientific data. *http://science.nasa.gov/missions/wmap/*

The **X-48B** is an advanced concept, fuel-efficient blended wing body aircraft. Boeing Phantom Works' advanced research and development unit has partnered with NASA and the U.S. Air Force Research Laboratory (AFRL) at Wright Patterson Air Force Base, Ohio, to explore and confirm the structural, aerodynamic and operational advantages of the blended wing body design. *http://www.nasa.gov/vision/earth/improvingflight/x48b.html*

Acronyms

AAIRS	Audit and Assurance Information Reporting System
AIRS	Atmospheric Infrared Sounder
ACAT	Automatic Collision Avoidance Technology
ACM	Attitude Control Monitor
AFO	Audit Follow-up Official
AICPA	American Institute of Certified Public Accountants
AIM	Aeronomy of Ice in the Mesosphere
AIRS	Atmospheric Infrared Sounder
ALHAT	Autonomous Landing and Hazard Avoidance Technology
ALIP	Annular Linear Induction Pump
ALR	Audit Liaison Representatives
AMS	Alpha Magnetic Spectrometer
AMSRE	Advanced Microwave Scanning Radiometer Earth Observing system
AO	Announcement of Opportunity
APG	Annual Performance Goal
ARC	Ames Research Center
ARMD	Aeronautics Research Mission Directorate
ARRA	American Recovery and Reinvestment Act
ASC	Accounting Standards Codification
ASP	Airspace Systems Program
AT	Aeronautics Technology
ATP	Aeronautics Test Program
AUC	Assets Under Construction
AvSP	Aviation Safety Program
CALIPSO	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations
CAPP	Constellation Assessment of Personal Property
CAS	Cross Agency Support
CCD	Charge-Coupled Device
CCDev	Commercial Crew Development
CCF	Capillary Channel Flow
CDR	Critical Design Review
CEV	Crew Exploration Vehicle

CFD	Computational Fluid Dynamics
CHS	Crew Health and Safety
CINDI	Coupled Ion Neutral Dynamics Investigation
CME	Coronal Mass Ejection
CMP	Continuous Monitoring Program
C/NOFS	Communication/Navigation Outage Forecast System
COTS	Commercial Orbital Transportation Services
CPIAC	Chemical Propulsion Information Analysis Center
CRO	Cumulative Results of Operations
CSRS	Civil Service Retirement System
DFRC	Dryden Flight Research Center
DM	Deferred Maintenance
DM2	Development Motor
DOD	Department of Defense
DOE	Department of Energy
DPMC	Directorate Program Management Council
DSIP	Dynamic Selection of Interface Patterns
ECR	Environmental Compliance and Restoration
EEO	Equal Employment Opportunity
EF	Exposed Facility
ELV	Expendable Launch Vehicle
EMA	Electromechanical Actuators
ENAs	Energetic Neutral Atoms
EO	Equal Opportunity
ERBIS	Engineering Review Board Information System
ERIC	Exploration Requirements for Institutional Capabilities
EOS	Earth Observing System
EOY	End of Year
ESMD	Exploration Systems Mission Directorate
ESSP	Earth System Science Pathfinder
ESTP	Earth Science Technology Program
ET	External Tank
ETDP	Exploration Technology Development Program
EUV	Extreme Ultraviolet
EVA	Extravehicular Activity
EXPRESS	Expedite the Processing of Experiments to the Space Station
FAA	Federal Aviation Administration
FAP	Fundamental Aeronautics Program
FAR	Federal Acquisition Regulation
FASAB	Federal Accounting Standards Advisory
FASB	Financial Accounting Standards Board
FBWT	Fund Balance with Treasury

FCI	Facility Condition Index
FECA	Federal Employees' Compensation Act
FEHB	Federal Employee Health Benefits
FEGLI	Federal Employees Group Life Insurance
FERS	Federal Employees Retirement System
FFMIA	Federal Financial Management Improvement Act of 1996
FPTBU	Funds to be Put to Better Use
FY	Fiscal Year
GAAP	Generally accepted accounting principles
GAO	Government Accountability Office
GC	Gas Chromatograph
GDGPS	Global Differential Global Positioning System
GeV	Giga-electronvolt
GOES	Geostationary Operational Environmental Satellite
GPM	Global Precipitation Measurement
GPRA	Governmental Performance and Results Act
GRACE	Gravity Recovery and Climate Experiment
GRAIL	Gravity Recovery and Interior Laboratory
GSFC	Goddard Space Flight Center
HQ	NASA Headquarters
HRP	Human Research Program
IBEX	Interstellar Boundary Explorer
ICC	Integrated Cargo Carrier
ICESat	Ice, Cloud, and Land Elevation Satellite
InSAR	Interferometric Synthetic Aperture Radar
IP	Intellectual Property
IPIA	Improper Payments Information Act
IPCC	Intergovernmental Panel on Climate Change
IPO	Integrated Program Office
IPERA	Improper Payments Elimination and Recovery Act of 2010
IOC	Initial Operation Capability
ISRP	Integrated Systems Research Program
ISS	International Space Station
IVGEN	IntraVenous Fluid GENeration
IVHM	Integrated Vehicle Health Management
JAXA	Japanese Aerospace Exploration Agency
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Flight Center
JWST	James Webb Space Telescope
KDP	Key Decision Point
KSC	Kennedy Space Center
LAFS	Lunar Analog Feasibility Study

LAPS	Lunar Analog Pilot Study
LaRC	Langley Research Center
LAT	Large Area Telescope
LCC	Launch Control Center
LCC	Lifecycle Cost
LCROSS	Lunar Crater Observing and Sensing Satellite
LDCM	Landsat Data Continuity Mission
LHB	Late Heavy Bombardment
LIS	Land Information System
LLCD	Lunar Laser Communication Demonstration
LOLA	Lunar Orbiter Laser Altimeter
LQP	Lunar Quest Program
LRO	Lunar Reconnaissance Orbiter
LSAH	Lifetime Surveillance of Astronaut Health
LRR	Launch Readiness Review
LSCR	Lunar Surface Concept Review
LSP	Launch Services Program
LWS	Living With a Star
M3	Moon Mineralogy Mapper
MARCbot	Multifunction Agile Remote Control Robot
MARES	Muscle Atrophy Research and Exercise System
MAVEN	Mars Atmosphere and Volatile EvolutioN
MCCS	Mission Control Center System
MDAO	Multidisciplinary design, analysis, and optimization
MELFI	Minus Eighty-Degree Laboratory Freezer for ISS
MERRA	Modern Era Retrospective Analysis for Research Applications
MICAST	Magnetically Controlled Convective Conditions
MISR	Multiangle Imaging SpectroRadiometer
mJy	Millijansky
MLLP	MidLevel Leader Program
MMS	Magnetospheric Multiscale
MODIS	Moderate Resolution Imaging Spectroradiometer
MOR	Missions Operations Review
MPLM	Multipurpose Logistics Module
MRO	Mars Reconnaissance Orbiter
MSFC	Marshall Space Flight Center
MSL	Mars Science Laboratory
MUST	Motivating Undergraduates in Science and Technology
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NextGen	Next Generation Air Transportation System
NEWS	NASA Energy and Water cycle Study

NLS	NASA Launch Services
NPAT	National Partnership for Aeronautical Testing
NOAA	National Oceanic and Atmospheric Administration
NRA	NASA Research Announcement
NRC	National Research Council
NRPTA	National Rocket Propulsion Test Alliance
NTRs	New Technology Reports
NTTS	National Technology Transfer System
NWS	National Weather Service
OCO	Orbiting Carbon Observatory
OE	Office of Education
OIG	Office of Inspector General
OMB	Office of Management and Budget
OMI	Ozone Monitoring Instrument
OM&S	Operating Materials and Supplies
ORR	Operation Readiness Review
OSI	Office of Strategic Infrastructure
PAR	Performance and Accountability Report
PDR	Preliminary Design Review
PID	Parameter Identification
PIV	Personal Identity Verification
P.L.	Public Law
PMM	Permanent Multipurpose Module
POES	Polar Operational Environmental Satellite
PP&E	Property Plant and Equipment
QuickSCAT	Quick Scatterometer
R&D	Research and Development
RBSP	Radiation Belt Storm Probes
RHESSI	Ramaty High Energy Solar Spectroscopic Imager
RPT	Rocket Propulsion Test
RSRM	Reusable Solid Rocket Motor
RSS	Rotating Service Structure
RTF	Return to Flight
SAA	Space Act Agreement
SAM	Sample Analysis at Mars
SBC	Single Board Computer
SBIR	Small Business Innovative Research
SDO	Solar Dynamics Observatory
SCaN	Space Communications and Navigation
SDO	Solar Dynamics Observatory
SEP	Solar Energetic Particle
SFFAS	Statement of Federal Financial Accounting Standard

SFW	Supersonic Fixed Wing
SGL	Standard General Ledger
SGSS	Space Network Ground Segment Sustainment
SID	Strategic Investments Division
SIR	Systems Integration Review
SMAP	Soil Moisture ActivePassive
SMD	Science Mission Directorate
SMS	Safety and Mission Success
SOC	Security Operations Center
SOFIA	Stratospheric Observatory for Infrared Astronomy
SOHO	Solar and Heliospheric Observatory
SOMD	Space Operations Mission Directorate
SpaceX	Space Exploration Technologies Corporation
SPoRT	Short-term Prediction Research and Transition
SRR	System Requirements Review
SS	Space Shuttle
SSME	Space Shuttle Main Engine
STEM	Science, Technology, Engineering, and Mathematics
STEREO	Solar Terrestrial Relations Observatory
STTR	Small Business Technology Transfer
SUP	Supersonics Project
TBCC	Turbinebased Combined Cycle
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TOGW	Takeoff Gross Weight
TRL	Technology Readiness Level
TRMM	Tropical Rainfall Mapping Mission
USAID	U.S. Agency for International Development
USGS	U.S. Geological Survey
VAAC	Volcanic Ash Advisory Center
VCAM	Vehicle Cabin Atmosphere Monitor
VLD	Vertical Light Deployment
WFO	Weather Forecast Office
WISE	Widefield Infrared Survey Explorer
WMAP	Wilkinson Microwave Anistropy Probe
WORF	Window Observational Research Facility
WRF	Weather and Research Forecast
WRP	Wide Range Pump

Center Information

NASA Headquarters (HQ)
Washington, DC 20546-0001
(202) 358-0000
www.nasa.gov/centers/hq/home/index.html

NASA Ames Research Center (ARC)
Moffett Field, CA 94035-1000
(650) 604-5000
www.nasa.gov/centers/ames/home/index.html

NASA Dryden Flight Research Center (DFRC)
P.O. Box 273
Edwards, CA 93523-0273
(661) 276-3311
www.nasa.gov/centers/dryden/home/index.html

NASA John H. Glenn Research Center at Lewis Field (GRC)
21000 Brookpark Road
Cleveland, OH 44135-3191
(216) 433-4000
www.nasa.gov/centers/glenn/home/index.html

NASA Goddard Space Flight Center (GSFC)
8800 Greenbelt Road
Greenbelt, MD 20771-0001
(301) 286-2000
www.nasa.gov/centers/goddard/home/index.html

NASA Jet Propulsion Laboratory (JPL)
4800 Oak Grove Drive
Pasadena, CA 91109-8099
(818) 354-4321
www.nasa.gov/centers/jpl/home/index.html

NASA Lyndon B. Johnson Space Center (JSC)
Houston, TX 77058-3696
(281) 483-0123
www.nasa.gov/centers/johnson/home/index.html

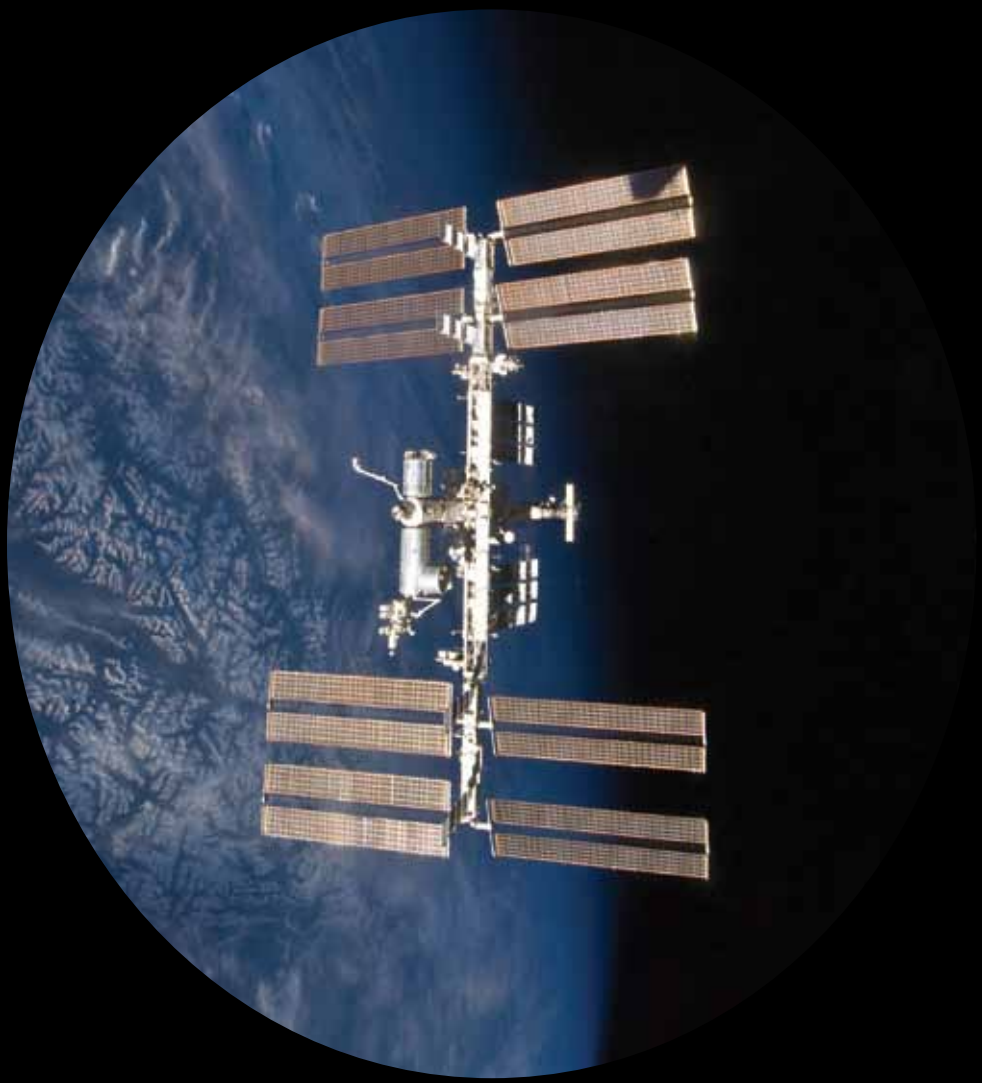
NASA John F. Kennedy Space Center (KSC)
Kennedy Space Center, FL 32899-0001
(321) 867-5000
www.nasa.gov/centers/kennedy/home/index.html

NASA Langley Research Center (LaRC)
Hampton, VA 23681-2199
(757) 864-1000
www.nasa.gov/centers/langley/home/index.html

NASA George C. Marshall Space Flight Center (MSFC)
Huntsville, AL 35812-0001
(265) 544-2121
www.nasa.gov/centers/marshall/home/index.html

NASA John C. Stennis Space Center (SSC)
Stennis Space Center, MS 39529-6000
(228) 688-2211
www.nasa.gov/centers/stennis/home/index.html

Photo back cover: Backdropped by Earth's horizon and the blackness of space, the International Space Station is featured in this image photographed by an STS-131 crewmember after Space Shuttle *Discovery* began to undock and separate from the Station. (Credit: NASA)



NASA Headquarters
Washington, DC 20546

NP-2010-11-690-HQ

www.nasa.gov